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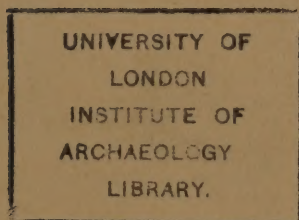
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Archaeology as Education and Profession¹

by J. D. EVANS

An Inaugural Lecture is an academic 'rite de passage' which is normally reserved for those who have recently succeeded to a University Chair. The present occasion is anomalous in that I have had to resign from such a Chair at this Institute in order to take up my present post, in which I am firmly classified, for good or ill, as an administrator first and an academic afterwards. The University has, however, tempered my administrative role as Director of the Institute of Archaeology by the soothing addition of the title of Professor of Archaeology, so that I can appear before you this evening with this fig-leaf at least to cover my academic nakedness.

It is the combination of the two roles to which I have just referred which has led me, more or less inexorably, to the choice of my theme this evening, and will largely condition my treatment of it. Both as a teacher of archaeology and as Director of a great Institute which is now a major producer of young academically qualified archaeologists, almost all of whom aspire to become professionals, I felt that I could hardly avoid the obligation to take stock of the present academic and professional status of the subject, and of its prospects for the future. The developments which have taken place during the last year or two in the funding of rescue archaeology in this country and the discussions which preceded and followed them, together with the present, and probably also future, economic limitations on educational activity, make this a peculiarly appropriate moment for such an exercise, lending to it a practical urgency which it might otherwise lack.

It is now nearly two decades since my predecessor, Professor Grimes, gave an inaugural lecture, entitled *Archaeology and the University* (Grimes, 1958), in which he attempted a rather similar review of the position of the subject at that time and tried to assess its current needs and the policies which the Institute ought to pursue in relation to them. Since then a great deal of water has flowed under many bridges. The Institute itself has changed greatly. We moved from St. John's Lodge in Regent's Park to Gordon Square in the following year, and with the change in location there began a process not only of growth in size, but of change in the character of our activities, a process which has continued to the present day. Not that our aims have changed in any fundamental respect, but simply that the means of attaining them have had to be adapted to suit the rapidly changing conditions in which archaeology has been operating during those years.

1. This Inaugural Lecture was given at the Institute of Archaeology on March 19th, 1975, under the Chairmanship of Professor W. Watson, M.A., F.B.A., F.S.A.

Our splendid new building within the University precinct (which is still the envy of many a Department of Archaeology both in this country and abroad) gave us the opportunity, which we have tried conscientiously to live up to, of becoming more truly the centre of archaeological activities within the University. The phasing out, to a large extent, of the part-time students who once absorbed such a large part of our attention, and the subsequent introduction of the first degree in archaeology, both changes envisaged by Professor Grimes in the lecture just mentioned, have been developments in which any loss has been more than compensated by the substantial gains. The latter, in particular, besides providing us with an excellent yearly intake of keen young students, has also enabled us to extend our collaboration with other Schools of the University which teach branches of archaeology, for whom we provide basic general courses and other services, enjoying in return the privilege of sending some of our students to benefit from their specialist teaching.

Archaeology itself has also changed its aspect enormously in the course of these two decades. While becoming steadily more dependent on a variety of scientific aids, it has passed through a period of intense scrutiny of its own methodology and aims, which has been a profitable, if somewhat traumatic, experience, leaving it strengthened in its self-confidence as a discipline. With some notable exceptions, to which I shall refer in more detail later, it has established itself more firmly in Universities in this country and in many others; for a variety of reasons, good, bad and indifferent, it has been steadily gaining more recognition from Governments as an activity which deserves their attention and support; while its popularity among the general public everywhere has continued to grow at a great rate, and shows no sign of abating.

So far, then, the picture seems to be a rosy one, but there are nevertheless many problems besetting the future development of archaeology which are far from being resolved as yet. While we may applaud the progress achieved, we must not ignore the difficulties ahead. Despite its great and growing popularity it seems to me that archaeology is still a widely misunderstood subject (not least by some of its friends, and even of its practitioners), and as a result of this it is still far from having achieved the place, either in formal education or in the general consciousness of society, to which its achievements, and its relevance to our human situation, entitle it. This is, of course, only a rough generalisation, but it is one which holds broadly true, I believe, for most parts of the world at the present day; though there are, of course, considerable differences in the position from country to country and continent to continent. In endeavouring to explain my point of view this evening I shall naturally be thinking most immediately of the situation as it is in Britain, though I shall try also to keep in view the wider context as far as possible.

To begin with, it is a striking fact that in this country, while the results achieved by archaeology are thought suitable to arouse the interests of tiny tots in their earliest years of education, the subject disappears from the curriculum of almost all schools after that stage, to reappear again only at undergraduate or at postgraduate level in some, but by no means all, of our Universities. Why is there this strange hiatus? And why is it that in our

new Universities founded since the Second World War and explicitly dedicated to a broader concept of University education than the traditional one, archaeology is almost everywhere conspicuously absent from the curriculum? The broad perspective which it offers of human economic and technological development might have been expected to appeal strongly to the planners of these institutions. Surely such a situation reflects the persistence of some fundamental misconceptions about the subject?

There is no doubt in my mind that this is so. Partly it is due to the relatively recent growth, and rather patchy development of the subject, partly to the fact that certain aspects of archaeology, generally the more sensational ones, have always been considered newsworthy and so have tended to attract an unfair share of attention. This has led to the building up in the public mind — and the public mind includes those of many distinguished academic and professional men and women who do not happen to have any special interest in the subject — of a rather confused image of what archaeology is and does. Despite the great amount of first rate work done, especially in recent years, by professional archaeologists and well informed popularisers to present a more coherent and realistic picture to the public, many of the established myths about it show a remarkable vitality. Two of these, which have a particular relevance to what I have been saying, were isolated and wittily commented upon some years ago by the American archaeologist Robert Ascher, in a short article which he called "Archaeology and the Public Image" (Ascher, 1960), and which was based on a reading of all articles on archaeology in *Life* magazine over a ten year period. First of all he found, not surprisingly, perhaps, that archaeology tended to be presented as a series of isolated, and often sensational and unexpected discoveries. The impression given he concluded, was not only that 'anyone can make a discovery', but that 'the discoverer achieves both the goal and the adventure of archaeology'. Linked with this was the suggestion that archaeology is chiefly a search for, in his vivid phrase, 'the firstest with the mostest'. Secondly, Ascher found that, dissociated from the theme of discovery, there was another which stressed the technical expertise of the archaeologist to the exclusion of his role in evaluating the evidence obtained and deriving historical and cultural inferences from it. 'To be an archaeologist, more often than not, he concluded, 'is to be an expert technician on call.'

Although they emanate from the United States, not Britain, these findings do, I think, throw some light on the otherwise curious reluctance to admit archaeology, or the findings of archaeology, to a place in the middle, or even in some of the higher levels of our educational system. It may well be that these, and other misconceptions about archaeology and archaeologists, are less widespread now than they were even a few years ago, yet archaeology is still regarded in many quarters as academically suspect; insufficiently coherent as an intellectual discipline, and at the same time too specialised and technical in its orientation to deserve a place in the general educational curriculum. It is only fair to say that many archaeologists have subscribed to this point of view, or at least to the latter part of it, and some at least would still prefer to see the study of it confined to the postgraduate level at Universities. This attitude is founded above all, I believe, on the once widely supported view that archaeology, because it has no limitation

of time and space, and produces results which are relevant to many different disciplines, must therefore be regarded as merely a collection of techniques for the recovery of a particular kind of information, rather than a discipline in its own right with its own subject matter and its own independent criteria for the evaluation of evidence. Such a standpoint has inevitably encouraged the view that archaeology is essentially an ancillary subject, a specialised skill to be added, if necessary, after a thorough grounding has first been obtained in some more legitimate 'educational' discipline, such as history, or classics, or even a branch of science. This, I think, was the philosophy which lay behind the widespread and persistent belief that archaeology was a suitable subject for study only at the level of a postgraduate Diploma or a Higher Degree. Among the unfortunate consequences which have stemmed from this outlook, perhaps the most serious is that the ninety-nine percent of the human past for which archaeology is the sole source of information has for too long been left in an educational limbo where, I fear, all too many of our brother academics and educationists have been quite content to let it remain.

It is evident from a number of developments, however, that in recent years this attitude has been losing ground. The introduction of new courses in archaeology at undergraduate level at a number of Universities, including our own; the creation of posts for archaeologists at some Teachers' Training Colleges and Colleges of Further Education; the existence for some years in the Cambridge G.C.E. of an Advanced Level option in archaeology, and the imminent introduction from 1977 of one at Alternative/Ordinary Level by the University of London, are all clear signs of a gradual change in attitudes. While this thaw is welcome, both in itself and in the promise which it holds out for the further extension of the teaching of archaeology at various levels, it seems clear that what has happened so far is a piecemeal affair. It indicates a gradual infiltration, brought about in response to the continually increasing popularity of the subject, rather than any overall change in policy, or fresh thinking about the place which archaeology ought to occupy in modern education. If we are really to make the best of the opportunity which is now afforded us, it will be necessary to think quickly and to develop a coherent policy while there is still time to guide developments in the way they should go.

To be able to do this effectively, we need to be quite clear in our minds about what we mean by archaeology and what it has to offer educationally. Over the past few centuries the term has been used in a number of different ways and with various limitations, but to judge by the numerous definitions in the more recent literature there is now a fair measure of agreement about its scope, though perhaps less so about its detailed aims. In the most general terms, we can safely say that archaeology is an approach to the study of man through what he has done rather than what he is physically, or what he has thought or written about himself. That is a polite way of putting it. Less politely, it is the study of rubbish, of all that discarded human litter whose quantity and toxicity has increased down the ages until it is now to be reckoned among the major threats to our continued existence as a species. Man is unique in the animal kingdom in this respect. While other animals leave behind only their bones, and sometimes, in special conditions of preservation, their skin, flesh, coprolites and footprints

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as testimony to their existence, men have also left durable evidence of their day-to-day existence in the form of cultural material – broken and worn-out tools, hearths, middens, abandoned buildings of all kinds, graves, disused industrial sites, mines, quarries, and so on. Archaeology arose when it was eventually realised that this apparently confused and useless human litter could be made to yield precious information about the history of man, information which could be obtained in no other way.

As a technique it has no temporal limitations, but can be applied just as well to historical, or even very recent, remains as to those of remote antiquity. A paradoxical, but logical, extension of its use in the United States of late has been its employment for purposes of modern sociological research and in support of the 'environmental lobby'. Salwen in a recent article suggested, among other things, that in Greenwich Village such 'sociocultural dimensions' as family size, income range and the ethnic composition of communities might be studied through soup-can typology and frequency; and vandalism in New York through plotting the "artefactual" pattern of its results (Salwen, 1973). The University of Arizona's quaintly named Garbage Project – reported on recently in a newspaper under the appropriate heading of 'Smelly Digging' – has apparently been able to demonstrate that a horrifying amount of meat (some \$500,000 worth a year) is wasted by the good townfolk of Tuscon. However lightly one be tempted to take these manifestations, they certainly demonstrate the viability of the method in unusual circumstances.²

Archaeology, or the study of human litter, whichever you prefer to call it, has a claim on the attention of educationists for two main reasons, I submit. First because of what it has achieved, If archaeologists really potted about with their refuse for its own sake, as they have sometimes, and not always without reason, been accused of doing, then what they do would have little significance for anyone else. But the bald and inescapable fact is that the study of this apparently unpromising record of the past, carried out with ever increasing intensity and refinement over the past century and a half, has completely revolutionised our conception of ourselves and of how we have become what we now are. In alliance with more securely-established sciences, such as geology, biology, etc., it has helped to produce the contemporary picture of man and his place in the universe. Moreover, its contribution to that part of the story for which we already possess traditional or contemporary written sources has been no less remarkable and revolutionary than its revelation of the remoter past. Surely a study which has accomplished so much in so short a time can claim that adequate account should be taken of its findings in the framework of education?

Secondly, I feel that archaeology has now reached a stage in its development where it has a contribution to make to education in its own right, as a mature discipline with its own standpoint and methodology. Despite a good deal of continuing controversy (which after all only serves to show that it is a live subject, not merely a fossil), the principles by which it works are now pretty well established, and any worthwhile study of it must start

2. Both of the projects referred to are, of course, serious undertakings which are producing useful results. A short, but informative, account of the work of the Garbage Project by one of its organisers, William L. Rathje, was published last year (Rathje 1974).

from a consideration of these. Since archaeological data consist of observations of the material results of human action, 'the fossilised results of human behaviour' as Gordon Childe (1956, p.1) so vividly put it, archaeologists must operate through inference and deduction, attempting to reconstruct past behaviour and its motives from the traces it leaves in the ground. In this they resemble other scientists who similarly have to infer a past situation from the disposition of things in the present. A topical example would be the cosmologist, whose task of trying to reconstruct the history of the solar system from observations of its present state has recently been so spectacularly helped through the data collected by the numerous recent 'space probes'. Whereas in many sciences such work demands much previous preparation and knowledge, and may involve abstruse mathematical calculations, archaeology is fortunate in that it can work on various levels. Thus even an elementary study of the subject can be made to evoke the exercise of judgement and critical power on the part of the student and provide a strong stimulus for their development.

Over and above this, the study of archaeology is to-day linked with a particular conception of man, which results from the complexity of its links with other subjects, and the great variety of influences which it has undergone. Despite this, or perhaps because of it, the archaeological standpoint, as it has emerged in recent decades, is a distinctive one, and one which I, among others, believe to be of great potential value to mankind. It is the achievement of archaeology that it enables us for the first time to see man steadily and whole '*sub specie temporis*', and to appreciate that the varied cultures and civilisations which he has created are, in the recent words of Professor Grahame Clark, 'outgrowths from a common trunk rooted in prehistoric antiquity' (Clark, 1970, p.47). At the same time it has also helped us to see him in his ecological setting as part of a complex web of interrelations linking humanity with both the non-human and the non-living environment. While this vision of man makes his varied achievements no less extraordinary and intriguing, it may perhaps help us to achieve that less biased, saner and more tolerant attitude which, in this shrunken world, with its many problems which affect everyone more and more immediately, is the chief prerequisite if we are to achieve a tolerable future. In this way archaeology, which, to quote Grahame Clark once more, 'may in time come to be recognised as one of western man's most significant contributions to mankind' (Clark, 1966, p.99), could ultimately prove to be very relevant to our present, and, above all, our future by helping to create mental attitudes conducive to our survival and prosperity.

Assuming the fact of archaeology's relevance to the educational process to be granted, I come now to the practical question of how it is to be accomplished. First of all there is the question of its place in pre-University education to be considered. Apart from the consideration of whether there should be any specialised teaching of the subject and its methods, there is the matter of incorporating the main results achieved by archaeology in the general educational framework. If it be admitted that every child should be provided, as part of its basic education, with a balanced outline, albeit and elementary one, of what is known of the history of his species and its place in the cosmos, then the

information provided by archaeology must of necessity occupy an important place in any such plan. I hope it will be clear from what I have already said that I am not simply talking about the primary level; I am thinking mainly of what follows, those earlier teenage years when 'education' tends to resolve itself into a series of discrete and almost unrelated 'subjects' which are studied with little or no reference to each other or to the balance between them. Here the special position of archaeology can be used both to provide a unique time-perspective for the human past and to help link up various traditional subjects belonging to both the humanities and the sciences. It is therefore ideally placed to play an important part in broadly based courses designed to provide the kind of general background which seems essential in any rationally planned scheme of education.

That this is not all mere day-dreaming is proved by the inclusion of knowledge derived from archaeology as part of the syllabus of the newly-devised G.C.E. Advanced level in Environmental Studies, whose introduction in a large number of schools in the near future has just been approved. It is easy to imagine other similarly broad courses in which it might also figure prominently and usefully in the secondary curriculum; such as, for example, a really comprehensive one covering the main outlines of human history. The argument against such courses is a familiar one, of course. They include too much, it is said, and must be taught at too superficial a level to be of any real value. This is really a question of what one thinks really matters — detail or general perspective. There is surely a case to be argued in favour of the inclusion of at least a few outline courses of this kind, which will help pupils to link up much of what they hear about in more detailed and specialised ones, and to see the real point of much that might otherwise seem to them simply arid and academic in the bad sense of that long-suffering word. For example, the Environmental Studies course already referred to is planned so as to bring all the heterogeneous material it includes to bear on contemporary environmental problems, in order that the student may come to realise the relevance of each aspect of his study to these. In this way he will emerge that much better equipped to make his own informed judgements in the continuing debate about what should be done to preserve a tolerable environment for us in the future. Other similar courses would naturally be planned in a different way, and would have different goals, but I have no doubt that in many instances the insights afforded by the discoveries of archaeology would be found to be very relevant and would contribute greatly to their effectiveness.

The desirability of teaching archaeology as such in schools, as distinct from incorporating the results it has achieved in broad 'link' courses of the kind just discussed, is of course a separate question. So long as archaeology is regarded as a specialised technique or series of techniques, rather than as a legitimate field of study in its own right, there is bound to be a considerable degree of prejudice against this. Even when this is overcome, there still remain many problems, both practical and intellectual, to be surmounted. The chief practical problem is, of course, how to provide for adequate teaching of such courses. This must inevitably involve questions of staffing policy and the availability of funds, over and above the more straightforward question of the production

of enough would-be teachers with the right qualifications. Since it seems most unlikely that many schools, other than perhaps the bigger comprehensives, would be able to indulge in the luxury of employing an extra member of staff purely to teach archaeology, it is probable that the archaeology will have to be taught by someone who also teaches another subject covered in the school's curriculum — in other words by a member of staff who has perhaps done a two or three subject degree, with archaeology as one part. Alternatively, it would have to be someone who had acquired his archaeological qualifications in some other way, such as by following Extra-Mural or Further Education courses, with involvement in fieldwork as an amateur. This however could give rise to other problems, which relate directly to the question of just how archaeology ought to be presented in schools. The chief danger obviously lies in the potential encouragement of such activities as destructive excavation and treasure hunting by overeager schoolchildren led by misguided masters. I know of no foolproof answer to this; obviously a great deal will depend on the design of the syllabus itself, on the kind of the advice made available to teachers, and ultimately on the quality of the teachers themselves.

Despite the obvious dangers, I am personally convinced that there is a good case for the inclusion of archaeology as a subject to be taught both at Ordinary and Advanced Level in schools. In the first place, as has often been pointed out, it occupies a useful middle ground between traditionally separate fields of study, and can help to lead a student's interest from one to another, or to broaden his appreciation of his own speciality. The designers of the new London University Alternative/Ordinary level syllabus in archaeology have been quick to seize upon this point. In their introductory remarks they shrewdly point out that it 'is intended to permit students whose studies are primarily in the fields traditionally labelled crafts, humanities and sciences, not only to obtain a knowledge of archaeology, but also to apply their own special interests in the subject'. One of the beauties of archaeology, of course, as anyone at all acquainted with it knows, is that almost any talent may turn out to be relevant, and may find its place as an aid to the pursuit and study of some aspect of it.

Secondly, archaeology is a subject which can be studied first of all in its general method and broad outlines, before proceeding to a detailed study of some particular period, region or aspect. The basic principles are the same overall, however much the details of their application may vary from period to period or place to place. The existing Advanced and Ordinary level syllabuses naturally try to combine the study of these principles with that of a particular area and period. Both quite naturally give prominence to the study of British archaeology, since this obviously allows the student to relate his classroom studies most easily and naturally to observations made in the field, and to the excavation experience which he will first obtain.

Finally, a note of self-interest creeps in. If archaeology is to be taught as an undergraduate subject, it would clearly be helpful to Universities if some at least of the candidates who apply had already had some grounding in the basic principles before they arrived. It would depend of course on how well those principles were imparted, and one could imagine disastrous situations arising. But speaking from our own experience at the

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Institute we have found this enormously helpful, and have certainly no reason to complain of the students who have come to us after having previously taken the Cambridge A-level in Archaeology.

This brings me at last to the discussion of the place of archaeology in the University. It is here, of course, that the vexed question of professionalism raises its head for the first time. What has been said about the educational value of archaeology in schools applies at least equally to Universities, and I would have no qualms in defending the claim that a degree in archaeology has an educational value equal to one in any other subject, and superior to a good many. But how far is it also to be regarded as a professional qualification, entitling its possessor to consider himself a 'complete archaeologist'? Clearly much depends on the design of the course, but even where there is a fieldwork requirement, as in quite a number of University courses in archaeology there is these days, the newly fledged graduate is not necessarily in any better position to consider himself an expert in archaeological fieldwork than the average person who has just passed his driving test is to consider himself an expert driver. Both have undergone a certain amount of instruction, and have been certified competent to cope with straightforward situations, but in both cases much practice is the prerequisite for a real mastery of the subject.

The problem essentially is that archaeology demands of its practitioners an unusual combination of qualities. Ideally they should be both intellectuals and practical men in the widest sense; have a scientific bent, yet be endowed with literary and artistic gifts of quite high order. It is a formula to which few actually measure up in practice, and in this sense we are most of us *incomplete* archaeologists. In the development of our subject there has always been some degree of tension between those who possessed these abilities in differing degrees, and it has often been the practical men who made the running at the expense of the more academically minded. There is a good reason for this. Apart from certain specifically vocational courses, such as medicine, higher education in Europe has until quite recently tended to be almost exclusively abstract and literary. Men trained in this tradition have usually been poorly equipped to perceive or exploit the real opportunities offered by archaeological evidence, and have often wandered off down sterile byways. This is no doubt why there has been among the great pioneers of archaeology an unusually high proportion of unconventional scholars, and of people who were altogether outside the boundaries of the world of learning.

With the growing recognition of archaeology and its inclusion as a subject taught in Universities, however, there has been a gradual change in the situation. More people with the right aptitudes have been coming into the subject in this way. But there will obviously always be a place for the serious amateur, whose experience and knowledge of the archaeology of an area or a particular subject are invaluable, and often outstrip that of the professional who must range more widely. In Britain, at any rate, we must regard him as one of the most valuable products of our tradition of archaeological research, a rare bloom to be cherished and encouraged. In the end, the distinction between whether a man earns his living by archaeology or not is unimportant. It is the quality of his work

that counts, and by that criterion there are only good and bad archaeologists. It should indeed be possible to expect a certain minimum standard of competence from the professional, but there is no reason why we should expect the good amateur archaeologist to fall below this, and many rise well above it.

Another character about whom we have heard a great deal of late is the unqualified professional digger. He is a relatively recent phenomenon and something of a problem. We have heard so much of him partly because of the Council for British Archaeology's recent proposals for the creation of a Professional Institution for British Archaeologists, proposals which were aimed chiefly at helping him to acquire a more secure position. Whatever the merits of these proposals — and for a variety of reasons, not least because they are now once more in the melting pot, I do not propose to discuss them this evening — it seems to me that the unqualified professional digger is at once something of an anomaly and, if he will pardon the expression, something of a red herring. If he is young, as is usually the case, and seriously wants to make a career in archaeology, then one can only advise him to do his best to obtain proper qualifications, in the form of a degree, and we in the universities should be prepared to do our utmost to help him to do so; if he does not wish to make it his career, then the problem really ceases to be one for us.

Returning now from this digression to the question of archaeology in the University, I have no doubt that the training we offer must clearly be first of all one which justifies itself in purely educational terms. Our undergraduate courses should therefore be broadly based, and be so constructed as to demonstrate the relevance of what is being studied to the contemporary situation and to the future, as well as offering a coherent account of the past. It is sad that the founders of many of our new Universities seem to have missed this aspect of archaeological studies, and apparently concluded that only subjects which dealt with modern times could be relevant to modern needs.³ They thus omitted from consideration the invaluable perspectives offered by a study of archaeology. Perhaps archaeologists themselves bear some blame for this, yet the arguments for its relevance are set out clearly and cogently in the writings of some of those now in this room, to go no further. One can only hope that the omission will be made good before too long, and in a few instances it seems to be happening already. Archaeology, one may point out in passing, is particularly suitable for inclusion in the kind of combined course which is favoured by many of these newer Universities, and is already taught as part of a combined degree at a number of the older ones.

But university courses in archaeology must at the same time double as vocational training and try to cater for the needs of those who wish to become professional archaeologists. In addition to their purely academic content, therefore, they should include instruction in the relevant practical skills and at least a modicum of field training. All this is, of course, desirable in any case, since a purely academic course can give only an incomplete idea of what archaeology is about. With the best will in the world, however, what can be included in such a course will not be sufficient by itself to make a

3. Of several books produced about individual universities during the 1960's which I have consulted, only one contained any mention of the subject, and then merely to record that it was considered suitable only for a Postgraduate Diploma.

student into a skilled fieldworker. All we can hope to do is to lay a sound foundation. Since we have, at any rate at present, no equivalent in archaeological training to the pre-clinical and clinical division of medical training, this will have to suffice, to be supplemented by further experience gained in-service afterwards. If this sounds a disappointing conclusion, it is at any rate a realistic point of view. Three years, which is the length of most University courses in archaeology, is little enough time to master all that a modern archaeologist must know.

We must keep in mind too, of course, that not all professional archaeologists will become fieldworkers and excavators. It is easy to be blinded by fashion in a matter like this, but it is vital that the concept of a professional archaeologist should continue to include those who devote themselves primarily to laboratory work, or to the scholarly synthesis of other people's results, as well as those who elect to serve in what one might call the front line of archaeological research. To think otherwise would be a narrow and ultimately a stultifying attitude.

At this point I find myself once more turning back to the Institute of Archaeology and its particular role in the present and future development of the subject. If there is a fact which is more certain than most it is that our Institute was founded above all for the training of professional archaeologists, with the expectation that most at any rate would be practising fieldworkers and excavators. "If the essential character of this Institute may be expressed in a word", said Sir Charles Peers, the then Chairman of our Management Committee, at the opening ceremony for the Institute's Regent's Park building in 1937, 'it is that it is . . . a laboratory of archaeological science, wherein the archaeologist of the future may learn the essentials of his business.' Despite all the changes which have come about in the intervening period of nearly forty years, that continues to be our central function. And we still approach it with that emphasis on methods and techniques which our founder, Sir Mortimer Wheeler, declared in his autobiography to be our 'primary and avowed purpose' (Wheeler, 1955, p.94), though he admitted that the Institute had been criticised on occasion for this emphasis. There is no such criticism to-day, and there is now little need for a crusading spirit about this aspect of our work. The boot is on the other foot with vengeance! In one respect we have, however, moved with the times. By cradling a full-blown rescue unit in our bosom we have tried to do our part in meeting a contemporary need, while at the same time securing adequate opportunities to our students to gain relevant experience in what may later become their full time job in archaeology.

But we are not in business to turn out *merely* archaeological technicians; nor, I am sure, would Wheeler himself want us to do this. As the centre of archaeological studies in the University of London we have a primary responsibility both for education and research in our field. I think I can fairly point to the international reputation which the Institute enjoys to show how thoroughly both these obligations have been discharged in the past. The rolecall of well-known archaeologists who have been connected with it either as teachers or students, or both, in the course of its short history is already a long one. Apart from Wheeler himself, perhaps the most famous name is that of Gordon Childe, our

first full-time Director, who must surely rank among the greatest educators and scholars of his time. It is of the utmost importance that these traditions too should be kept up and developed. In the last analysis it is only by the quality of the research carried out in it and the mental stimulus engendered by its teaching that any institution of learning must expect to be rated, and can hope to be remembered. I hope and believe that we in our generation will not be found entirely wanting in the requisite qualities.

If what I have said this evening seems to be more like a 'Tract for the Times' than an academic exercise, I apologise; but I have already said why I felt moved to attempt it. In concluding, I am tempted to borrow a few sentences from an unlikely ally, best known in archaeological circles for his complete scepticism about the contribution of archaeology to knowledge of pre-Roman Britain. On the 19th October, 1773, Dr. Samuel Johnson, accompanied by the faithful Boswell, visited the island of Icolmkill and explored the ruins of Iona. Reflecting later on this experience in his *Journey to the Western Islands of Scotland*, Johnson penned the following characteristically orotund phrases: 'To abstract the mind from all local emotion would be impossible if it were attempted, and would be foolish, if it were possible. Whatever withdraws us from the power of our senses; whatever makes the past, the distant or the future predominate over the present, advances us in the dignity of thinking beings'. That, in a nutshell, is why archaeology is an education, and why it has become a profession.

REFERENCES

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|-----------------------|------|---|
| Ascher, Robert | 1960 | Archaeology and the Public Image, <i>American Antiquity</i> , 25, 1959-60, p.400. |
| Childe, V. G. | 1956 | <i>Piecing Together the Past</i> , Routledge and Kegan Paul, London. |
| Clark, Grahame | 1966 | Prehistory and Human Behaviour, <i>Proceedings of the American Philosophical Society</i> , 110, p.91. |
| Clark, Grahame | 1970 | <i>Aspects of Prehistory</i> , University of California Press, Berkeley and Los Angeles. |
| Grimes, W. F. | 1958 | Archaeology and the University, <i>University of London Institute of Archaeology 13th Annual Report and Bulletin for 1955-56</i> , p.37. |
| Rathje, William L. | 1974 | The Garbage Project, <i>Archaeology</i> , 27, p. 236. |
| Salwen, Bert | 1973 | Archaeology in Megalopolis, in <i>Research and Theory in Current Archaeology</i> , (Ed. Charles L. Redman), John Wiley & Sons, Inc., New York and London. |
| Wheeler, Sir Mortimer | 1955 | <i>Still Digging: Interleaves from an Antiquary's Notebook</i> , Michael Joseph, London. |

Rescue Archaeology in Sussex, 1974

A Progress Report on the Sussex

Archaeological Field Unit

By

Peter Drewett (ed.), Owen Bedwin, Martin Bell, David Freke, John Gibson-Hill, Vincent Gregory, Anthony King, and Tim Tatton-Brown

INTRODUCTION

The Institute of Archaeology's Sussex Archaeological Field Unit came into operation on 1st April 1974. The idea of such a unit arose from discussions held between the Department of the Environment and the Institute of Archaeology in July of the previous year. These discussions led to the appointment of Mr. P. L. Drewett in October 1973 to undertake a pilot survey which was published early in 1974. (Drewett, 1974) Immediate threats to the Bronze Age turf barrows at Minsted (Fig. 1 No 3) and West Heath (Fig. 1 No 4) led to their excavation prior to the formal establishment of the Unit. In April 1974 a Field Director (Mr. P. L. Drewett) was appointed with a staff of two Field Officers (Dr. O. Bedwin and Mr. V. Gregory). Institute students, and others, were then invited to undertake specific projects within the Unit framework. The selection of projects for 1974 was based on several considerations. Firstly, sites already being excavated with direct Department of the Environment grants were incorporated into the Unit framework, although they continued to be jointly sponsored by local archaeological groups. Such sites include Bishopstone (Fig. 1 No 4), Newhaven (Fig. 1 No 5) and Crawley (Fig. 1 No 6). Secondly, three sites were excavated at the direct invitation of the Department of the Environment, where the site-owners had given three months notice of their intention to

destroy a site scheduled under the provisions of the Ancient Monuments Acts. The excavations at West Heath (Fig. 1 No 2), Pagham (Fig. 1 No 7) and Winchelsea (Fig. 1 No 10) come under this category. Thirdly, the excavations at Alfriston (Fig. 1 No 1), Minsted (Fig. 1 No 3), Angmering (Fig. 1 No 8) and Lewes (Fig. 1 No 9) were undertaken primarily on the advice of members of the Local Advisory Panel, (see Drewett. 1974, 3.3.) Such sites were selected from several, as potentially able to answer specific outstanding archaeological questions in Sussex. All four sites are in the process of being destroyed. Finally the Elsted Parish survey (Fig. 1 No 11) begins a project of intensive parish surveys, while the A27 survey (Fig. 1 No 12) and the Ardingly Reservoir Survey (Fig. 1 No 13) were detailed surveys of areas which will be totally destroyed.

In selecting sites in the first year from the mass of sites destined for destruction, it was also thought advisable that the projects should be spread both chronologically and geographically. Chronologically, the sites range from the sixth millennium B.C. occupation under a barrow at West Heath, down to the 19th Century A.D. tanning pits at Lewes. Geographically, the sites range from the heathlands of West Sussex, the chalklands of the South Downs and the claylands of North Sussex to Winchelsea in the far east of the county. Although any research project operating in a rescue situation will appear fragmentary at the beginning, it is hoped that as the project develops, more sites are excavated, and detailed surveys are undertaken a comprehensive picture of the archaeology of Sussex will emerge.

1. The excavation of an oval burial mound of the Third Millennium B.C. at Alfriston, East Sussex.

by PETER DREWETT

The oval burial mound at Alfriston (Fig. 2) is one of the twelve long barrows listed by Grinsell in the counties of West and East Sussex. (Grinsell 1934) The surviving Sussex long barrows fall into two distinct geographical groups. The largest group is in East Sussex between the Whitehawk and Combe Hill Causeway Camps while the remaining three are clustered to the west of the Trundle in West Sussex. The twelve long barrows in Sussex range from the modest 24 metres of the Alfriston barrow to the substantial 67 metre length of Hunter's Burgh. With a length range as great as this it appears likely that these structures may vary either chronologically or functionally, or perhaps both. Indeed, it

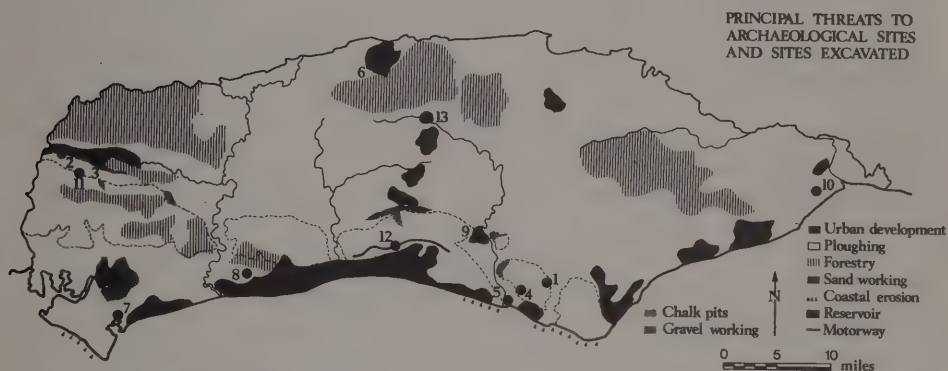
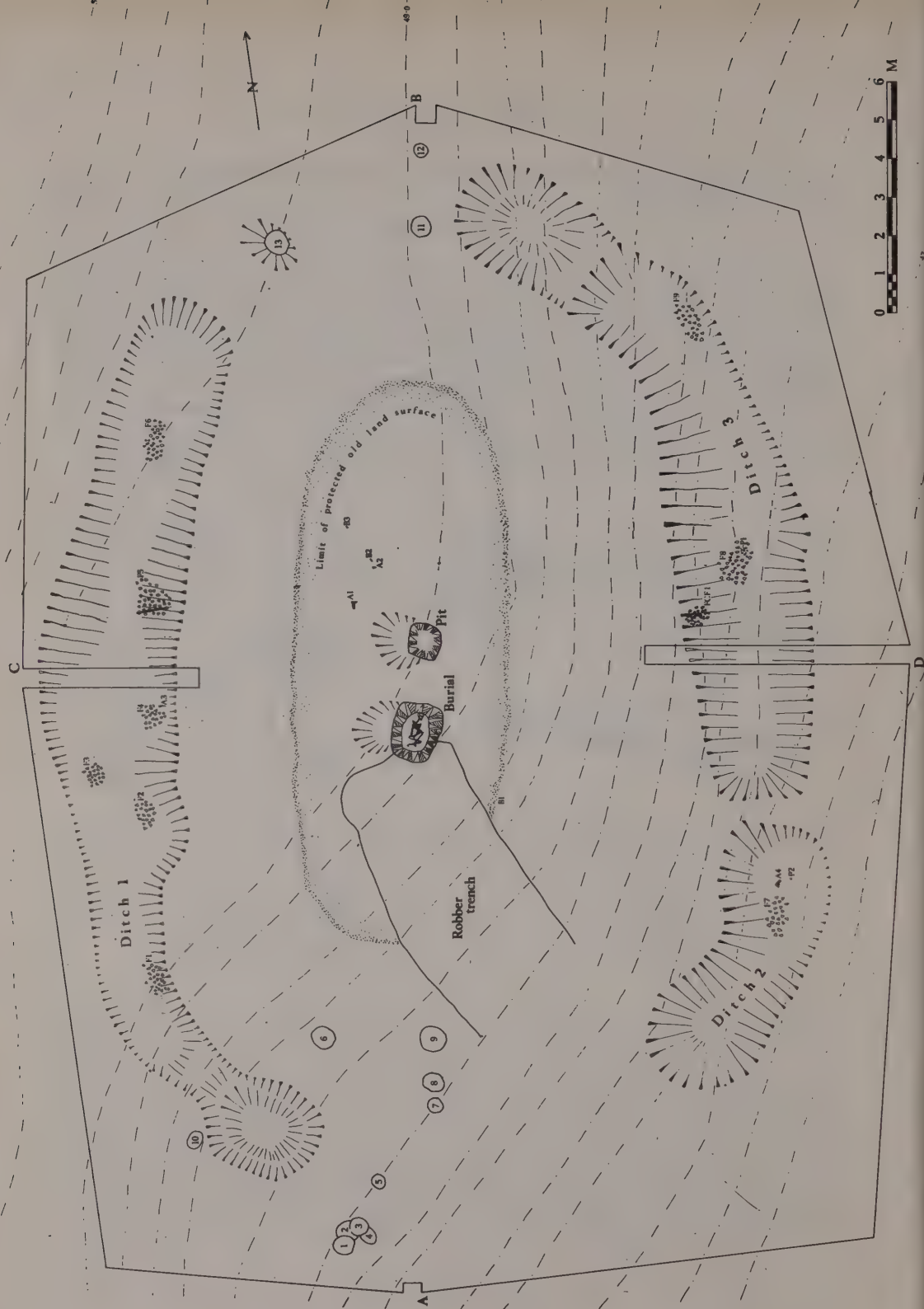


Fig. 1 The Principal threats to archaeological sites in Sussex and those excavated by the Sussex Archaeological Field Unit.

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|----------------|-------------------------------|
| 1. Alfriston | 8. Angmering |
| 2. West Heath | 9. Lewes |
| 3. Minsted | 10. Winchelsea |
| 4. Bishopstone | 11. Elsted Parish Survey |
| 5. Newhaven | 12. A.27(M) Survey |
| 6. Crawley | 13. Ardingly Reservoir Survey |
| 7. Pagham | |

may be possible to define a distinct class of oval barrow in Sussex to include the Alfriston Barrow, the Stoughton Down Barrows, the possible barrow at Litlington and even perhaps Cliffe Hill and Firle Beacon. These barrows contrast strikingly with the great long barrows like Long Burgh and Windover Hill. The possible existence of oval barrows as a class was first defined by Colt Hoare (1810) but Thurnam (1870) cast doubt on their existence, while Ashbee cautiously suggested that field survey together with "selective excavation might restore this class to our archaeological literature" (Ashbee, 1970). The excavation of the small oval barrow near Long Burgh at Alfriston may perhaps go some way towards this reinstatement.



The selection of the oval mound at Alfriston for excavations in 1974 was the result of several factors. Firstly, the absence of any long barrow excavations in the geographically crucial area of Sussex made such an excavation a priority in Neolithic studies in South-east England. Secondly, the unknown chronological position of the Sussex long barrows together with their possible functional differences made it desirable to excavate one. Thirdly, in 1934 Grinsell records the mound as being 2 metres high (Grinsell 1934, 220) whereas in 1974 only 25 cms. of mound survived above the Neolithic land surface. This rapid erosion of the mound appears to be largely the result of agricultural operations. The Alfriston barrow was the only Sussex long barrow that was being totally ploughed in 1974. However, ploughing has seriously encroached on at least three other Sussex long barrows.

The barrow was excavated, with the kind permission of the owner Mr. J. Lewis, using the quadrant method. (Plate I) A series of ditch sections were then dug and finally the whole mound was removed together with the contents of the ditches with the exception of two 50 cm. wide baulks. (Fig. 2)

The barrow was found to consist of a simple dump mound probably derived from material out of two flanking ditches. Although badly plough-damaged, the approximate extent of the mound was suggested by the surviving extent of the protected Neolithic land surface. (Fig. 2) This suggested a broad berm between the mound and its flanking ditches. The mound covered two axially placed pits, the southern one of which contained a crouched burial (Plate II) of a young female (at present being studied by Mr. T. P. O'Connor). Unfortunately she was not accompanied by any grave goods. No information was obtained as to the function of the northern pit. However, it may be considered as related to the primary burial ceremony. To the north-west of the pits an antler pick (A1 on Fig. 2) together with a fragment of another (A2) and two animal bone fragments (B2 and B3) were located on the buried land surface. Although perhaps more likely to be rubbish left by the builders of the mound, they too may be related to some primary burial ceremony. A general scatter of flint flakes was found over the mound, particularly on the southern side, but due to ploughing few could be claimed to be in a primary context. For example, from the plough soil removed by hand from the site, although mainly from the top of ditches, 2,217 flint flakes were found together with three cores, 10 scrapers, 16 retouched flakes, one chisel, one hammer stone, three notched flakes, 20 pieces of rough workshop waste and eight fire cracked flints. Considerably more worked flint was found in the ditch silts and nine concentrations of flakes (F1-F9 on Fig. 2) were located in primary contexts. Although again most probably construction period debris, this flint waste may perhaps be part of some primary burial ceremony. Another antler pick (A4 on Fig. 2) together with a broken tine (A3) were also located in primary positions in the ditches. The only pottery found in primary contexts consisted of one sherd (P2) in Ditch 2 and a small cluster of sherds in Ditch 3. Unfortunately, the pottery is singularly undiagnostic although its fabric would fit well into a Neolithic context.

The ditches, which appear to be pit dug, were perhaps dug in three main phases. (Fig. 2) Firstly a broad ditch, some 15 metres long on the western side and 14 metres on the

eastern side, was dug on either side of the burial. Secondly, a curved section some 8 metres long on the eastern side and 7 metres on the western side was added to the southern end of the main ditches. The phase I and II ditches were linked on the western side but a causeway was left between them on the eastern side. Finally shallow ditch terminals were added to the southern end of the western ditch and the northern end of the eastern ditch. This arrangement left a broad causeway at the southern end of the mound and a narrower one at the northern end.

A number of post holes were found in each causeway (Fig. 2, Nos. 1-13) but because of extensive plough damage at either end of the mound, only the bases of the post holes were found. Particularly deep ploughing in the south-east corner of the mound may well have resulted in the loss of further post holes in that area. In the case of all thirteen post holes found, the modern plough soil rested directly on top of the post holes, thus destroying any stratigraphical relationships between post holes and the mound. Post holes 11 and 13 may represent vertical uprights in the northern causeway, while post holes 6 and 9 could be the remains of a facade on the southern causeway (directly facing Long Burgh). Post holes 7 and 8 could perhaps indicate one side of an entrance structure in front of the facade, but because of the plough damage any such hypothesis will remain inconclusive. However, future excavation of undamaged oval mounds may help elucidate this problem. The possibility remains, however, that these post holes are not Neolithic at all, but are the remains of fences around pre-Roman Iron Age or Romano-British fields laid out from this pre-existing mound. (see below)

The structure of this barrow, together with the nature of the flintwork, the type of pottery and the presence of antler picks all suggest a Neolithic date for the mound. However, the somewhat undiagnostic nature of the finds make any more precise dating difficult. Nevertheless, antler samples A1, A3 and A4 together with the leg bones of the burial have been submitted to Harwell for a C-14 determination.

Although the destruction of the mound by ploughing has prevented us obtaining very much information about post-Neolithic use of the mound, considerable evidence concerning the post-Neolithic land use was obtained from the ditches. All the ditch sections showed a remarkably similar sequence. Six main layers were defined. A sequence of land use was obtained from the differing natures of the layers and dated by associated pottery. Confirmation of this sequence, together with further evidence of the local environment, will be available from a mollusca analysis being undertaken by Dr. K. Thomas.

In the bottom of all ditches chalk rubble indicated primary silting soon after the construction of the mound. The wide berm between the mound and ditch perhaps indicates that little of this silt would be derived from the mound. In most ditch segments primary and secondary chalk silting could be defined. Above this was a layer of light brown, friable soil, virtually devoid of artifacts. This may be considered to be a developing soil horizon, perhaps indicating grazed pasture from the Neolithic until well into the pre-Roman Iron Age. A thick layer of angular flints above this, associated with many worn sherds of pre-Roman Iron Age and Romano-British pottery indicate ploughing

adjacent to the barrow with periodic manuring of the fields. Fragments of carstone (being studied together with other foreign stones by Miss C. Cartwright) from the Greensand which outcrops to the north of the site perhaps indicates manure being brought from villas to the north. The remains of a negative lynchet were found cutting into the ditch silts on the eastern side of the mound and the line of post holes (7, 8, 9, 11, 12) may perhaps be a marking-out fence for a "Celtic field". Above this plough soil another layer of fine, brown, friable soil, perhaps indicates a reversion of the Down to sheep runs in the Saxon period. Directly above this was the modern plough soil. The only post-Roman activity noted from the site was an unsuccessful attempt to rob the barrow in the mid 19th century. A large robber trench some 7 x 3.5 metres was dug into the southern end of the mound. (Fig. 2)

II. The excavation of three round barrows of the Second Millennium B.C. at West Heath, West Sussex.

by PETER DREWETT

The round barrow cemetery situated on the Folkestone Beds of the Lower Greensand at West Heath Common is perhaps one of the most compact and best preserved cemeteries on the heathlands of Sussex (Fig. 3). It is therefore particularly regrettable that economic necessity should result in its total destruction. However, this commercial need for sand has presented us with a unique opportunity to totally excavate a barrow cemetery by stripping both the actual mounds and as much of the area between them as is practicably possible. This long term operation has been made possible solely by the cooperation and interest of the owner, Mr. Borrow. Two of the barrows (I and II on Fig. 3) were excavated in November, 1973 under the general direction of the author and the field supervision of Mr. Richard Williams and Dr. Owen Bedwin. Barrow III was then excavated as part of the Institute's Easter Field Course in 1974. Associated with the excavations, a detailed field survey of West Heath has revealed Mesolithic flint knapping sites and a survey has been made of the Seventeenth Century enclosure banks.

Barrow I (Fig. 4)

Barrow I had very nearly been reached by the sand pit when the Department of the Environment invited the Institute to undertake this project. The northern section of the ditch around the barrow was therefore not excavated for safety reasons. The remainder of the barrow was totally excavated by the quadrant method to produce full north-south and east-west sections. (Plate III).

The mound survived to a maximum of 2 metres at its centre. The top metre of mound was badly disturbed by rabbits and root action, but in the centre a turf mound some 18 metres in diameter was located. This buried an undisturbed and well preserved old land surface (Plate III). A berm varying from 3 to 6 metres in width separated the turf

WEST HEATH COMMON ROUND BARROW CEMETERY

INTERIM PLAN 1974.



Fig. 3 West Heath 1973-74. General plan of Bronze Age Round Barrow Cemetery.

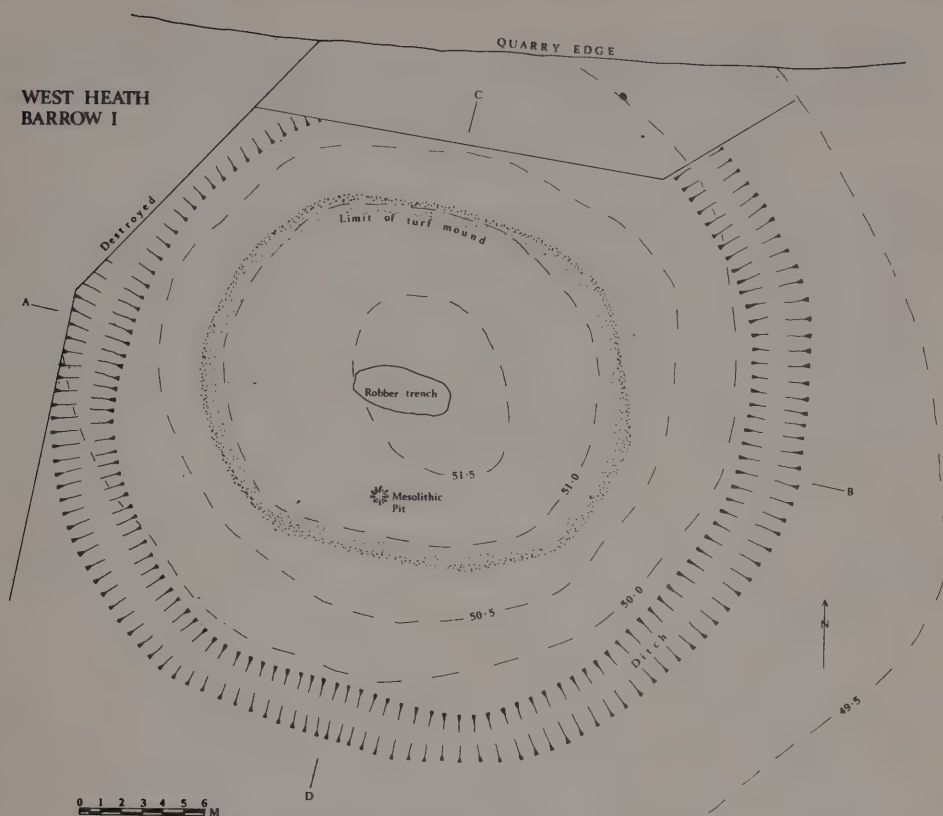


Fig. 4 West Heath 1973. Barrow I. Contours at 0.5 metre intervals.

mound from a surrounding ditch. The orange sand dug from the flat-bottomed ditch had been piled around the turf mound and perhaps originally capped it. Unfortunately, the centre of the mound had been robbed, but the very acid nature of the sand makes it most unlikely that the robbers located any human remains.

The only feature found buried under the barrow was a small pit to the south of the centre. (Plate IV). The pit was filled with charcoal and appears to have been a small hearth. Unfortunately, no artifacts were found in it. However, a sample of the charcoal was submitted to the Harwell Carbon 14/Tritium Measurements Laboratory (Ref: HAR 645) and an uncorrected date of 6150 ± 70 b.c. was obtained. Such a date, even if corrected, puts the pit clearly into the late Mesolithic period and as such may be considered related to the Mesolithic flintwork found in disturbed contexts particularly in the ditch around the barrow.

The only other finds from this barrow consisted of a few worked flints which could be post-Mesolithic together with a few sherds of Romano-British pottery from the surface

layers in the ditch. Unfortunately, insufficient charcoal for a C-14 date was found in a primary context, but soil samples were taken for a pollen analysis, being undertaken by Professor G. W. Dimbleby. Soil samples were also taken and examined by Miss S. Harrison to determine whether or not mites are preserved in this soil.

Barrow II (Fig. 5)

Barrow II consisted of a very slight mound surviving to a maximum of 40 cms. in height. A central turf mound some 6 metres in diameter, but only 20 cms. high was all that survived of this barrow. The top 20 cms. of the mound was badly disturbed by roots and rabbits which had also destroyed much of the turf stack. Although there was no sign of robbing, no trace of a burial was found although even under ideal conditions, nothing more than a soil silhouette could be expected. Fortunately, using flotation techniques, it was possible to obtain a little charcoal from the buried old land surface under the mound and this has been retained at Harwell to await low level C-14 counting.

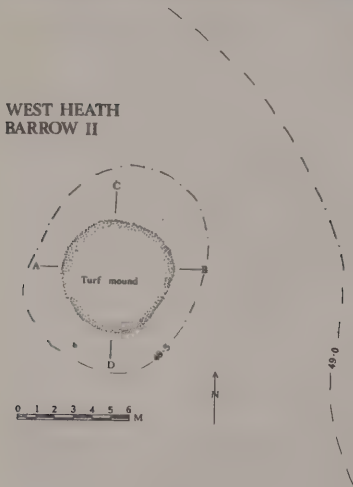


Fig. 5 West Heath 1974. Barrow II
Contours at 0.5 metre intervals.

Barrow III (Fig. 6)

Barrow III was the most complex of the three barrows excavated so far. (Plate V). The barrow was found to have been constructed in two phases with a surprisingly long gap between the two periods of building.

Phase I consisted of a large turf mound some 20 metres in diameter (Plate VI) around the foot of which a circle of stake holes indicated the existence of hurdling around the mound. (See Plate VIII for reconstruction). Some 2 metres out from this hurdling a ditch was dug (Plate VII) and the material from the ditch piled in the triangle created by the slope of the turf mound and the vertical hurdling. The very fine sand soon washed through the hurdling, thus protecting the vertical face of the hurdling which must have rotted within a few years of its erection.

WEST HEATH
BARROW III

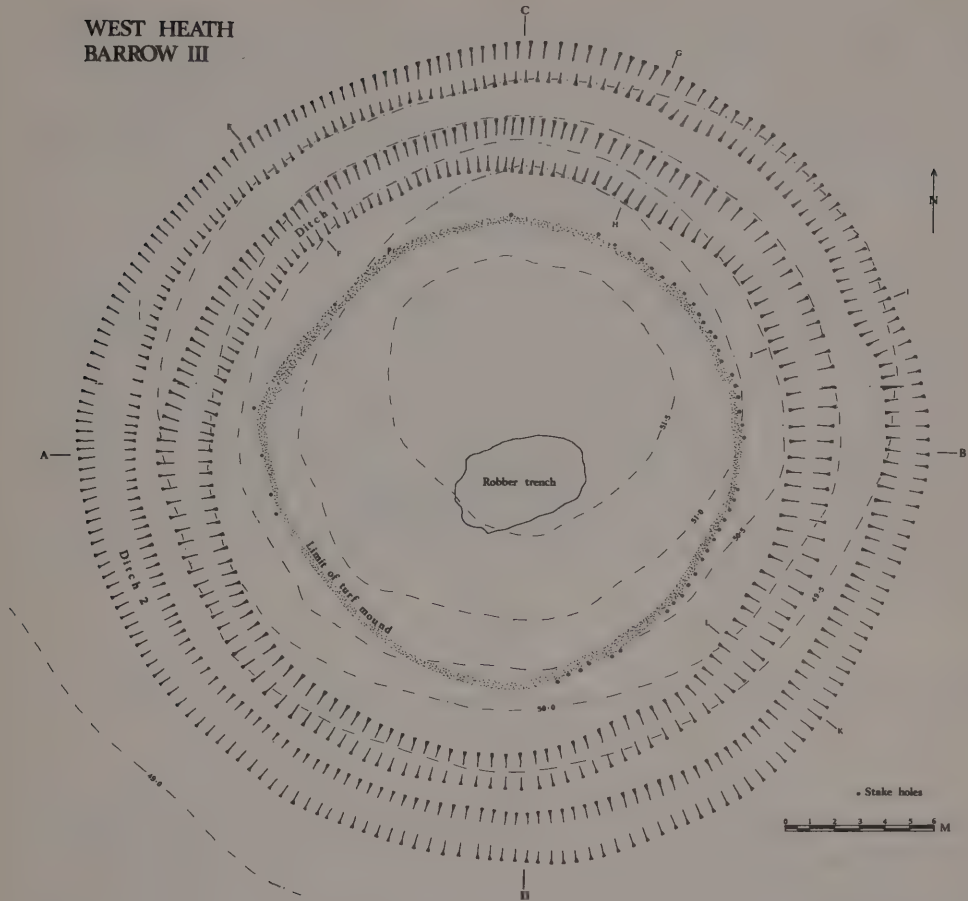


Fig. 6 West Heath 1974. Barrow III. Contours at 0.5 metre intervals.

The central turf stack protected a well preserved old land surface from which sufficient charcoal was obtained for a C-14 date. Harwell (HAR 647) produced an uncorrected date of 1680 ± 100 b.c. for this sample. Unfortunately, a large recent trench, apparently machine dug, had destroyed the central area of the barrow, but the acid nature of the soil makes it most unlikely that much was found in this previous excavation.

Phase II consisted primarily of the addition of a second encircling ditch which was flat bottomed and steep sided in contrast to the more V-shaped Phase I ditch. The sand from this ditch was heaped up over the outer lip of the mound and buried the inner ditch. It therefore effectively sealed a charcoal layer, perhaps a hearth, in the top of the partly

silted Phase I ditch (Plate VII). A Carbon 14 determination obtained for this sample (HAR 648) gave an uncorrected date of 1270 ± 180 b.c. Although the addition of a second ditch some 400 years later possibly indicates the addition of further burials, because of the nature of the soil and later disturbances no trace of them was found.

The finds from Barrow III, like those from Barrows I and II, produced nothing of use in dating the structures. The majority of the diagnostic flint work from Barrow III was Mesolithic and had clearly been disturbed in the construction of the barrow.

Areas A and B between barrows

A large area was stripped by machine between barrows I and II (area A) and between barrows II and III (area B) in the hope of finding cremation areas or other structures relating to the construction of the barrows or ceremonies associated with their use. (Fig. 3). Unfortunately, nothing of the barrow period was found. However, a small concentration of Mesolithic flakes was found in area A and an enclosure bank sectioned in area B. This enclosure bank (Fig. 3) perhaps dates to the enclosure award of 1632 in which West Heath, formerly used as common grazing, was divided among the cotlands and yardlands of Wenham and West Harting. A second section through this bank was cut to the north of area B and revealed parallel ditches with a bank between perhaps originally topped by a hedge.

III. The Excavation of a turf barrow at Minsted, Stedham, West Sussex.

by PETER DREWETT

In September, 1973 a small turf barrow was excavated at Minsted prior to its destruction by sand quarrying. (Plate IX). The barrow was situated on the Folkestone Beds of the Lower Greensand. The soil is a well-developed humus-iron podzol, with a deep bleached layer and a thick accumulation horizon which extends into the undisturbed Folkestone sand. The natural knoll on which the barrow was situated originated because of a local ferruginous concretion of the sand, a feature visible in the quarry section as it formerly existed to the east of the barrow.

The barrow was excavated using the standard quadrant method (Plate IX) although because of the excessively friable and fine nature of the sand, which blows about readily in the wind, the southern quadrants were partly excavated using a modified strip method.

The barrow appears to have been constructed on a localized knoll perhaps occupied intermittently by small Mesolithic hunter-gatherer bands (Fig. 7). Although there was no great concentration of Mesolithic material under the barrow a general scatter, together with more on and around the barrow, indicates at least some occupation. Considerably more Mesolithic flintwork has been found to the north-west of the barrow in areas now destroyed by the sand pit (P. A. M. Keef, pers. comm.). These appear to have been actual flint working floors. The high concentration of ivy pollen noted by Professor Dimbleby

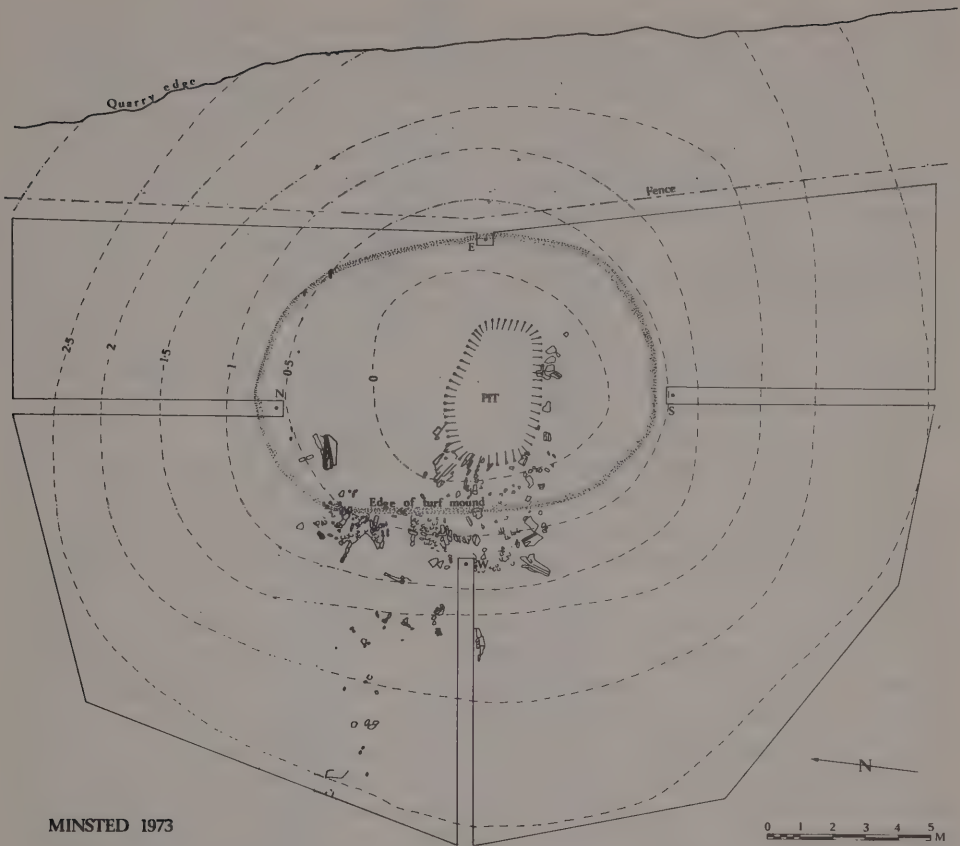


Fig. 7 Minsted 1973. Plan of turf barrow. Contours at 0.5 metre intervals.

(Dimbleby, 1975) from a horizon under the buried Bronze Age land surface, is explained by him as possibly indicating the use of ivy as winter fodder, perhaps for red deer. If this is so, the knoll could perhaps be seen as a local feeding point from the height of which the herders could survey the safety of the herd.

Towards the end of the Mesolithic period windblown sand appears to have buried the Mesolithic horizon and above this a soil horizon developed (Fig. 8 layer 5) on which heather, together with light alder, oak and hazel woods flourished. (Dimbleby, 1975). The barrow itself is constructed almost entirely of turf, which pollen analysis would suggest came from a similar environment to that indicated by the buried old land surface. Presumably, therefore, a large area around the barrow was cleared of turf. If so, the structure in its original state would have consisted of a turf mound surrounded by a wide zone of clean, white sand. The turves in the stack were not particularly regular in shape or size, although they tended to average some 30 cm. square. They were mainly placed on

the stack grass side up, but some were inverted. After the mound had been constructed to a height of about 70 cms. the whole was capped with a layer of grey sand (Fig. 8, layer 4). Finally, this layer was capped with a few more turves. Although it is possible that more sand was heaped over the turf stack (Fig. 8, layer 2), because of the ease with which this sand becomes airborne, it is more likely that layer 2 consists of material resulting from the breakdown of turves and the development of a soil cover. Layers 6 and 7 (Fig. 8) appear to be windblown sands that built up against the side of the mound.

No sign of a burial was found but this is most likely due to the acidity of the soil and the fact that the barrow had been robbed in the past. (Fig. 8, layers 10, 11, 12). Although few artifacts were found in the barrow material, much worked flint was found on the surface of the slopes of the mound. This may possibly be related to some primary ceremony, but is perhaps better explained by the use of the sheltered slopes around the mound by wandering herdsman knapping occasional flint tools. The few finds of Romano-British pottery could perhaps be explained in a similar way.

Unfortunately, no direct dating evidence was obtained for this barrow. However, turf structures of this type are usually ascribed to the Early Bronze Age. For example, a Carbon 14 date of 1680 ± 100 b.c. was obtained from the old land surface beneath a similar turf barrow on West Heath Common, Sussex (see above), but the West Heath Cemetery continued in use for at least 400 years, as the latest date is 1270 ± 180 b.c. Little other direct dating evidence is yet available from Sussex turf barrows, as although field evidence would suggest a considerable amount of previous excavation, generally ascribed to the 18th-19th centuries, finds of materials other than flint appear to be non-existent. The absence of primary burials and grave goods such as pottery is generally ascribed to the high acidity of the soil, together with its highly pervious nature, exemplified by the development of well developed humus-iron podzols. In the case of the Minsted barrow, therefore, in the absence of any conclusive dating, it appears best to suggest that the little evidence we have would not be inconsistent with an Early Bronze Age date, perhaps between 1800 and 1400 B.C.

IV. Excavations at Bishopstone, East Sussex

by MARTIN BELL

On Rookery Hill, Bishopstone, a complex of occupation sites covering the period between the Late Bronze Age and the sixth century A.D. was under destruction by the plough. Part of the site had been the subject of excavations by Mr. David Thomson in 1967-8, when a housing estate was constructed over an Anglo-Saxon cemetery and some associated buildings. Excavations were continued by the Brighton and Hove Archaeological Society between 1968 and 1972 on adjoining arable land (Bell 1972). In 1974 excavations were conducted jointly by the Field Unit and the Brighton Society (Plate X). Since the site is being excavated as a result of intensive plough destruction, it follows that much will already have been lost as a result of ploughing and the natural process



Fig. 8 Minsted 1973. Sections through turf barrow.

of solution operative on chalk. Some Early Iron Age post holes of diameter 50 cms. are only 5 cms. deep. In these areas half a metre may have been eroded. This should be borne in mind in any interpretation of the structures or their distribution.

Earlier excavations have shown that the first occupation dated from the Late Bronze/Early Iron Age transition. This was succeeded by an enclosure of the Early Iron Age within which was a settlement and outside which was a series of fields. Pottery from pits appears to cover all the locally recognizable phases of the Iron Age. Romano-British occupation was represented by two second century enclosures and a number of pits, hearths and corn drying ovens of the third and fourth centuries. In the Pagan Saxon period a large settlement had existed on the west slope of the hill; associated with it was a cemetery of 118 graves.

In 1974 one fifth of a hectare was cleared within the Early Iron Age enclosure (Fig. 9B), including part of one of the Romano-British enclosures. The earliest features were shallow scoops which are interpreted as quarries for chalk rubble. As such they may have provided material for a boundary round the earliest settlement. Pottery from the primary fill of the scoops is in Late Bronze Age tradition, bucket shaped vessels with flint, shell and organic temper. In some instances the hollows were used to work flint, and contain flakes, cores and hammerstones. Most of the finished tools of this period are end scrapers. In the secondary fill of the scoops were angular shouldered jars with flared rims and a constricted neck. Two contemporary pits contained little artifact material, but a very good assemblage of carbonized seed and vegetable matter.

Post-dating these features, and in one instance cutting through the scoops, was the enclosure ditch of the Early Iron Age. Previous seasons' work showed it to enclose an area 110 m. in diameter, and to have a 6 m. wide entrance on its north-west side. Any associated bank had been totally removed by erosion. A 15 m. length of the ditch was excavated in 1974. It had a complex history of successive phases of silting, some right to the top, followed by recutting and had served as an effective boundary for a considerable period of time. In its top fill was a large pottery assemblage, crude bag-shaped vessels with flint and shell grit and finger impressions along a flat rim predominating. Much of this pottery appears to continue the traditions current in the earlier features described as Late Bronze Age. Contemporary with these vessels are finely burnished sherds from pots with pedestal and ring bases. This layer also produced broken triangular loom weights with coarse perforations, and salt boiling bricks. The association of a large number of pottery sherds, fired clay objects, and signs of burning in the top of this ditch suggests that when it was partly silted up the area was used for bonfire firings of pottery and loom weights.

Four metres outside the enclosure ditch was a slight negative lynchet. Cross plough marks were found in the chalk sealed by later Iron Age layers. An unploughed strip separated two fields, and here a large number of root holes indicated the former presence of a hedge.

In the southern part of the enclosure and opposite the entrance were seven four-post structures. Three had post holes of similar size, and sides of 2.5 metres. These lay in a line about 5 m. inside the ditch and spaced at 5 m. intervals. The fill of one post contained

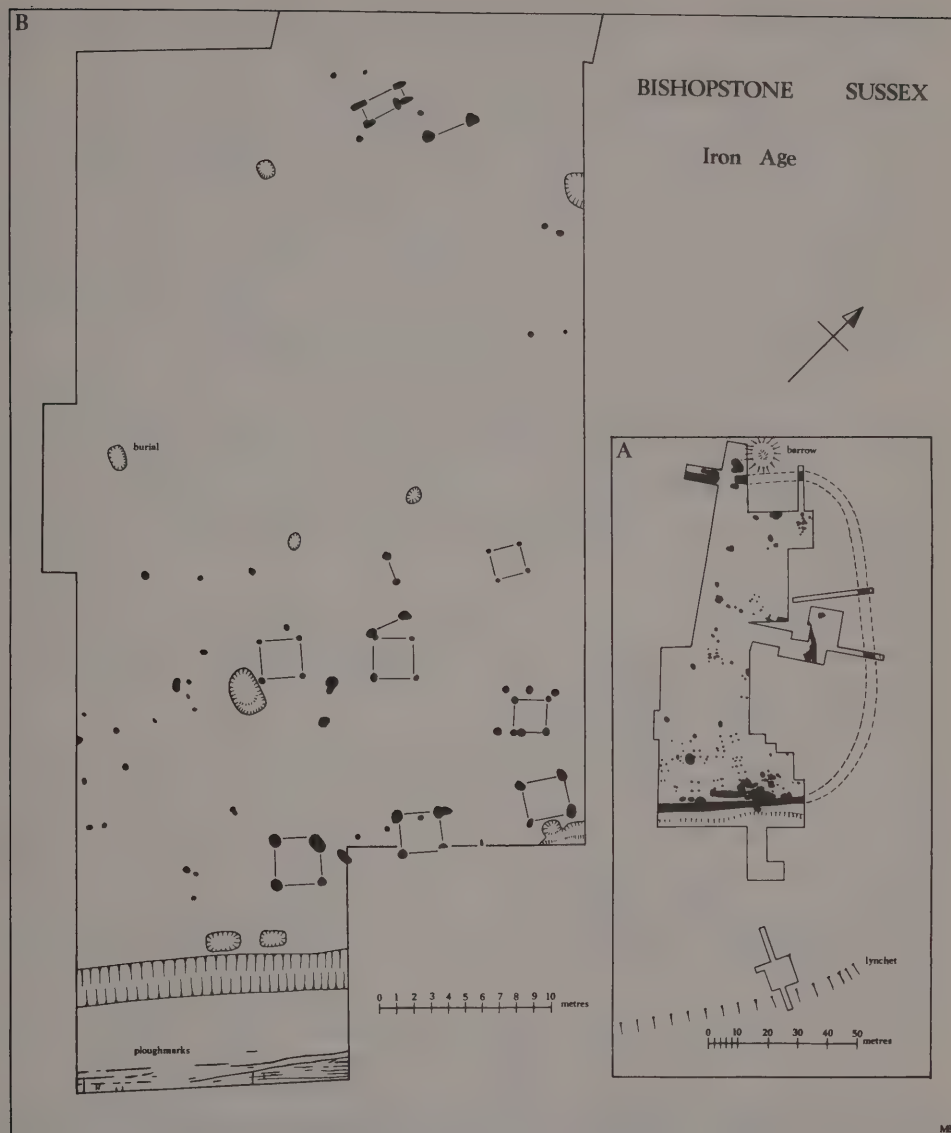


Fig. 9 Bishopstone 1974. Plan of Pre-Roman Iron Age features.

half of an Early Iron Age bowl, burnished inside and out, and with a flaring rim and constricted neck. Other post holes produced much cruder sherds, similar to those from the earliest stratigraphic phase. The features which contain these different pottery forms are all quite clearly contemporary. They show the diversity of Iron Age ceramic forms in use at one time which makes dating most difficult. Four other square buildings of four posts lay near the above group. One of these appeared to be post-dated by a six-post building. This was rhomboid in plan, with sides of 3 m. and 3.5 m. wide. At the north-west end of the excavation was a rectangular four-post structure with large oval posts. A number of paired posts were also recognized. The base of a small, round pit produced a chalk loom weight, saddle quern, and a pottery group including bag-shaped vessels with finger impressions on the rim and jars with angular profiles.

For the Early Iron Age we now have the plan of a large proportion of the site (Fig. 9A). The enclosure, which is far too slight to be defensive, is most probably a stock compound with a settlement on its southern edge. The animal bones are the subject of a specialist paper by Miss A. Gebbels (1974), who reports the presence of cattle, horse, pig, sheep, dog and bird in that order of decreasing importance. The floral evidence from floated soil samples and impressions in pottery has been reported on by Mr. J. R. B. Arthur, who notes that in this period the majority of cereal remains are Spelt (*Triticum spelta*) and Oats (*Avena* sp.).

Our conclusion is that this was a small mixed farm exploiting the pastures of the chalk upland to its north, but with surrounding arable represented by fields just outside the enclosure. The Ouse Valley, which would then have been a flooded estuary, was exploited for shell fish and salt boiling.

The later phases of the Iron Age were little represented in this excavation although examples of all of Cunliffe's (1974) regional grouping of pottery for this area are present in pits excavated in previous seasons. One pit dated to the Middle or Late Iron Age by a few fragments of associated pottery contained the contracted skeleton of a young male. (Plate XI). This gave the impression of having been thrown into the pit after some silt had accumulated. A specialist paper by Mr. R. J. G. Concannon states that he was a robust male of 30 to 40 with evidence of healed injuries to the post-cranial region, and a picture of massive dental ill health; of 29 sockets only six contained serviceable teeth. His height was 5'8" to 5'9".

In the north-east part of the excavation was the corner of one of the Romano-British enclosures first found in 1968. A pottery group from this ditch and an associated pit includes globular jars with narrow necks, decorated with swags or with finger impressed raised bands. These techniques are present in the Late Iron Age pits on the site, and were clearly continuous into the second century when they are found associated with Samian ware.

Overlying these somewhat eroded traces of Iron Age and Romano-British occupation were six buildings of the migration period (Fig. 10B). Three buildings formed a group centred on a rectangular timber building (Structure 1) showing two phases of construction. The first phase was 7 m. x 5 m. Its gable ends were rows of double post

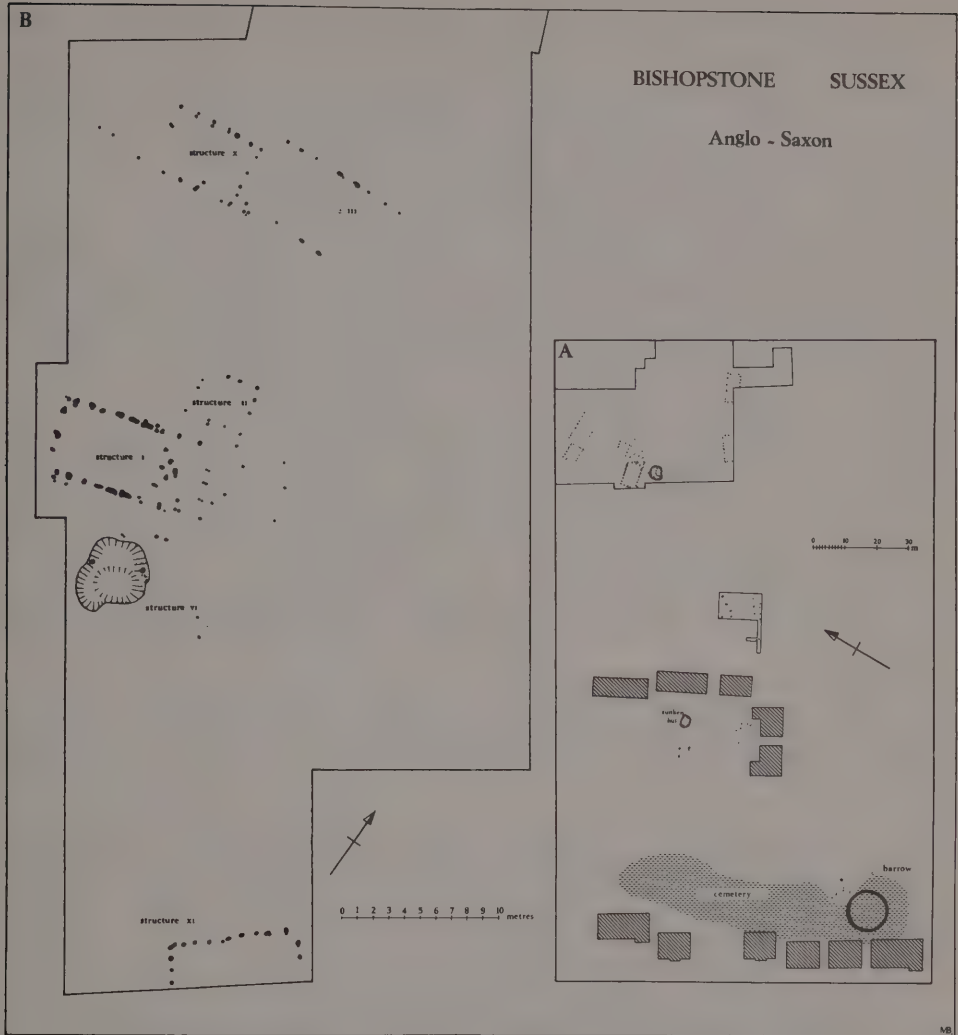


Fig. 10 Bishopstone 1974. Plan of Anglo-Saxon features.

holes and its corners non-existent, or represented by shallow posts. Both the north and south walls had three massive post holes which were 40 cms. deep. Later the structure was rebuilt, this time entirely using double posts and with an increase in length of 10 metres. Adjacent were what appeared to be two ancillary structures.

Two and a half metres to its south was a sunken hut (Structure VI) with its gable post holes forming a line parallel to the main building. The distance between the gable posts was 3.3 m., the width 4 m. This structure was excavated by Mr. Thomson in 1968.

Its floor was sunk 40 cms. into the chalk, but one half was excavated 50 cms. below this, as if to form a storage area or cellar. A series of shallow steps at the south corner suggest an entrance. On the upper floor level were 108 stake holes of average depth 4 cms. Structure II was on the opposite side of the main building and 1.20 m. to its north. It was a slightly built rectangular structure measuring 3.6 m. by 3 m. A doorway 1.5 m. wide probably existed on the south side facing the main building.

Ten metres to the north of this group were two post hole buildings overlying the Romano-British enclosure ditch. One of the buildings (Structure III) had been very badly eroded by modern ploughing, one end and a corner had been totally removed. Of one side all that remained were the oval post holes marking a doorway at the mid-point of its longest side. The building had two such opposed doorways of width 80 cms. Structure III would originally have measured 10 m. x 5 m. Half a metre from the west wall was Structure X, a rectangular building on the same axis as Structure III but only 4.4 m. wide by 5.6 m. long. It had two opposed doorways at the east end of its longest sides. That on the south was 1.4 m. wide and flanked internally by a post to take the door. That on the north was 80 cms. wide. From its south-west corner a fence led outside the excavation.

Twenty-four metres south-east of the group of three buildings was Structure XI. This was a rectangular wooden building of length 8 m. Only half of its width lay inside the excavation area. On its longest side was a doorway one metre wide with a flanking post hole. Ten metres to the west of Structure XI was a similar building excavated in 1971. (Bell 1972, Fig. 9).

This settlement is probably associated with the Anglo-Saxon cemetery excavated by Mr. Thomson in 1967-8 (Wilson 1968 and 1969). This was 210 metres to the south-west (Fig. 10A). One timber building was actually in the cemetery in an area left free of graves and next to the Bronze Age barrow which had served as the focus of the cemetery. Forty metres north-east of the cemetery was a sunken hut and nearby were traces of a wooden building. Only a small amount of pottery has been found associated with these buildings. It appears identical in vessel form and fabric to that found in the graves. Four sherds are stamped; two with a barrel oval stamp, and two with rosette stamps (Bell 1972 Fig. 10). One piece of metalwork from the cemetery has been published (Evison 1968). This is a quoit brooch style buckle believed to date from the first half of the fifth century A.D.

On the basis of the nucleation of fifth century burials between the rivers Ouse and Cuckmere, and the corresponding lack of villa estates, Welch (1971) has argued that this was a treaty area given to fifth century Foederati. In which case this site with its early buckle and strategic position may be one of their settlements.

Acknowledgements:

I am grateful to Mr. G. White for permission to excavate and to the excavation staff: Misses P. Norman, E. Guy, M. Barnes, Mrs. B. Westley, Messrs. Green, Makin, Sharpe, and Mr. and Mrs. K. W. Suckling.

V. Excavations at Newhaven, East Sussex.

by MARTIN BELL

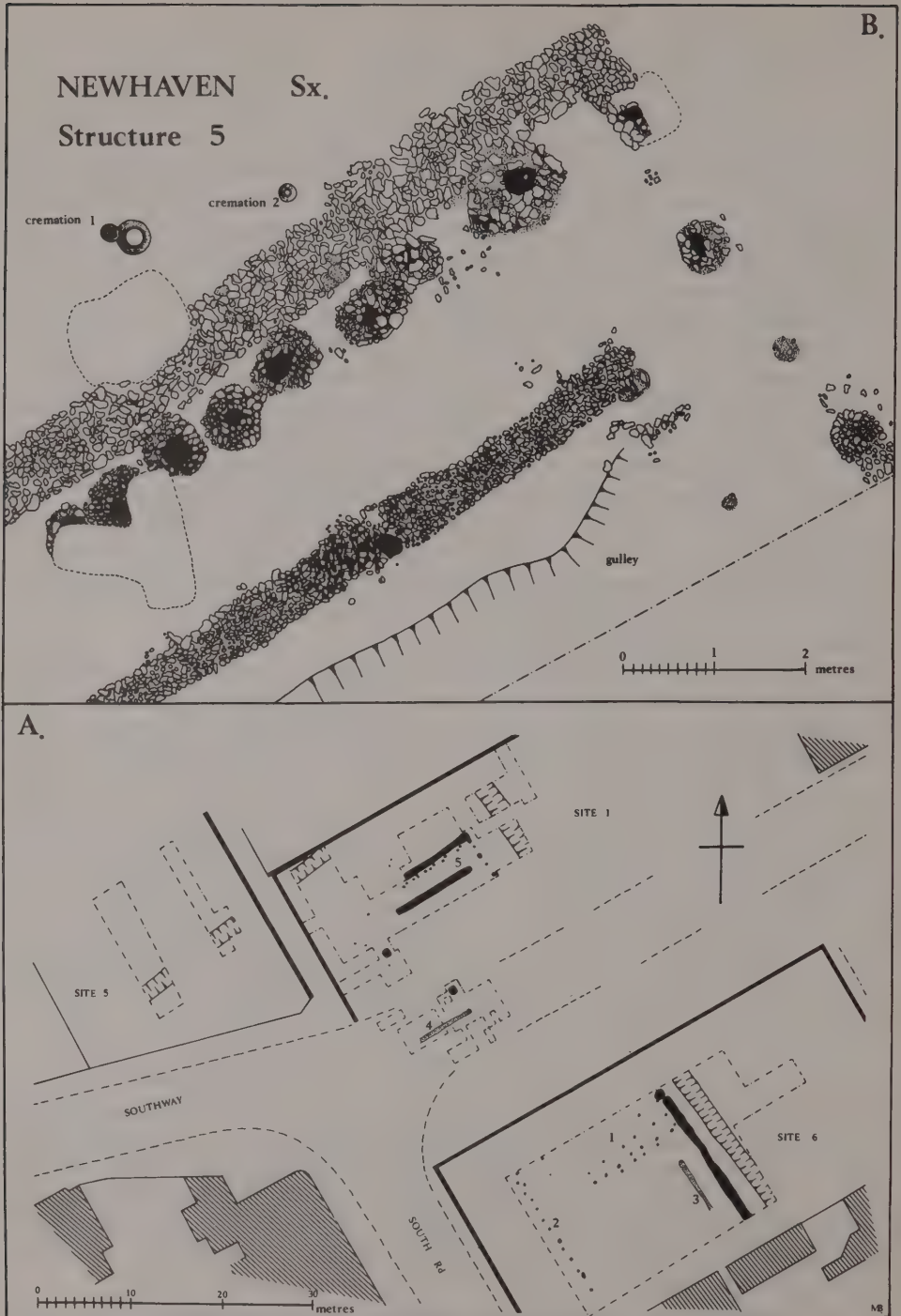
Rescue excavations in the town centre of Newhaven have been carried out by the Brighton and Hove Archaeological Society since 1971. This year the Unit and the Society completed the current programme of excavations. In previous seasons excavations have taken place on three adjoining sites prior to the construction of the southern section of the Newhaven ring road in 1971 (Sites 1 and 5), and the Newhaven Police Station in 1972/3 (Site 6).

These excavations showed that the site lay on a slight promontory of clay with flints projecting into the alluvium of the Ouse Valley. The clay with flints represented a partially denuded surface of the Pleistocene. Periglacial involutions underlay a pattern of ice wedge polygons and stone stripes. The fill of the ice wedges produced a bifacially flaked core and a number of joining flakes. The fact that joining, unrolled flakes were found associated suggests that they were not subject to subsequent ice movement and date from the closing phases of the Weichselian. This year a channel 6 m. wide and 60 cms. deep was found to contain alluvially deposited silt and six unrolled flint flakes. A section through natural suggested that the channel was in part the result of the sorting of partial size fractions under Periglacial conditions, rather than simply a melt water erosion feature. In the Holocene fluvial erosion and soil development was accompanied by sporadic occupation in the Mesolithic and Bronze Age.

In the Romano-British period the site was a spur of dry ground projecting slightly into the tidal estuary of the river Ouse 1 kilometre from its mouth. Occupation began in the mid-first century (Fig. 11A), and a rectangular enclosure is inferred from two lengths of ditch joining in a right-angle. On the inside of this right-angle were a number of wooden buildings.

Structure 1 consisted of 22 post holes in four lines covering an area 11.5 m. x 4.5 m. One interpretation is that this was a granary. Following its demolition, a flint wall was constructed over its east end. The wall is interpreted as a boundary. At the north it terminated in a large post hole that is presumed to mark an entrance. Structure 2 was a line of post holes 18 m. long. The post holes held D-shaped timbers which were alternately spaced so that a plank wall could be held between them. Structure 3 was an isolated length of beam-slot. A similar length, Structure 4, was associated with a number of post holes. This building was probably demolished in the late first or early second century A.D.

Structure 5 was the most substantial building; it was found in 1973, and was the subject of excavations in September 1974. To the west this building had been destroyed by Victorian terracing, and to the south by the building of the Newhaven ring road in 1971. All that remained for excavation was the north-east corner of what may originally have been a much larger building (Fig. 11B and Plate XIII). The north-west wall of Structure 5 was 70 cms. wide and well constructed of flints. At one end it terminated in a post hole. The post hole was one of a line just inside the wall. This line of posts had two



phases. The latest phase appeared to be contemporary with the wall and cut through members of a similar, earlier, line of post holes. The building's north-east wall was only a single line of post holes with no associated flint wall. An internal wall ran parallel to the north-west wall and 2.5 m. from it, ending 1.3 m. from the west wall at a possible internal doorway. South of the wall was a gully 20 cms. deep. This could have served as an internal drain, and may suggest that part at least of Structure 5 was a byre. If so, its north-east wall may have been open.

The building has at least two periods represented by the post holes along its north-west wall. Structurally this wall should not have required a well constructed wall and vertical posts. However, the evidence did suggest that at least the latest phase of the posts was contemporary with the wall. Perhaps the most likely hypothesis is that an existing wooden building was refurbished, its north-west wall timbers replaced and an external stone wall added for appearance rather than structural necessity.

Just outside the north-west wall were two cremation burials found in 1973. One consisted of a large local made storage jar, probably first century A.D. in date. It contained the cremated remains of a young adult, probably a male; with it was a small grey pot. The second cremation was contained in a spherical grey poppy head beaker. The occupant was a child of 18 months to 2 years, buried with a melon-bead and a dark brown annular bead.

Structure 5 appears to have been demolished in the second century A.D., probably during the Antonine period. The whole site was systematically levelled. Areas of burning associated with quantities of nails suggest that timbers were piled on a bonfire. The gully was filled with building rubble and quantities of wall cement. Walls were removed down to the foundations but never fully robbed out. The ditch was finally infilled with building rubble, painted wall plaster, window glass, roof, floor and box tiles, floor cement and some waterproof plaster. This demolition debris indicates that here was a small, early Roman villa, the site of which was occupied from the mid-first century until the Antonine period when it was abandoned.

VI. The excavation of a Romano-British iron-working site at Broadfields, Crawley, West Sussex.

by JOHN GIBSON-HILL

A series of building developments to the south-west of Crawley resulted in the discovery during 1970 of a Romano-British industrial settlement. (For summary of previous work see Gibson-Hill, 1974). The site, bisected by the A.23 London to Brighton Road, appears to consist of a conglomerate of ore workings, dwellings and smelting areas extending throughout the new development. Continuing rescue excavations have been concentrated during the early part of 1974 on Site II. In an attempt to provide more detail, this report concentrates on one specific, but nevertheless representative area, and is followed by a superficial summary of the other areas examined in 1974.

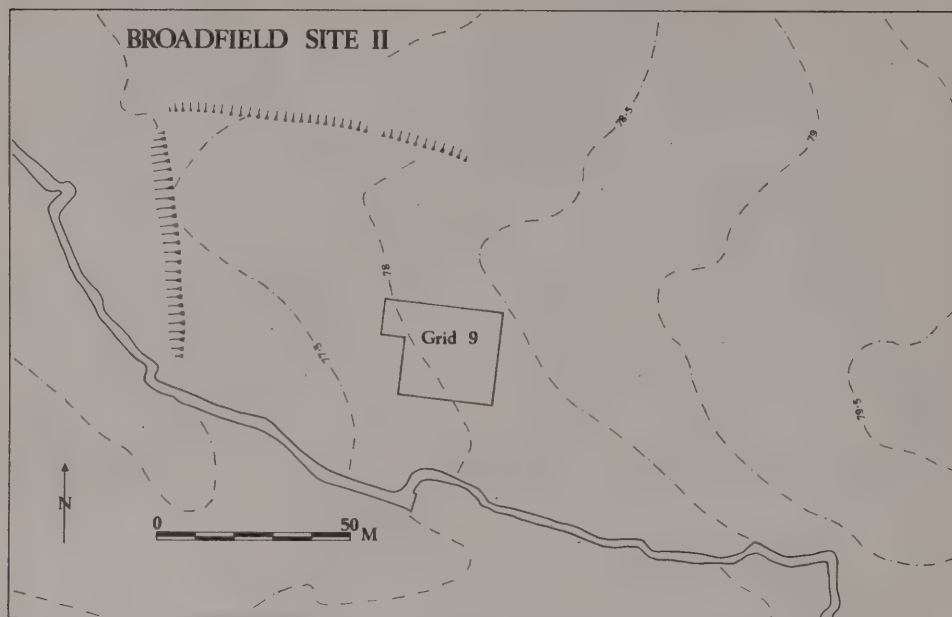


Fig. 12 Crawley 1974. Plan of Site II showing position of Grid 9.

Site II

The excavations, often under difficult conditions, of the small enclosure located on this site, are now near completion. It seems that an area measuring approximately 76 metres by 63 metres, was originally contained by a ditch and bank, that still survives on the northern and western sides (Fig. 12). Within this area the remains, covered by a shallow soil deposit, primarily consist of features cut into the natural Wealden clay. While attempting to define the eastern limits of this settlement, an area approximately 31 metres by 24.5 metres was stripped mechanically, thus enabling us to trace the V-shaped perimeter ditch for some 26 metres (Fig. 13). To the west of the ditch a number of features including post holes, post pits, refuse pits and a small furnace group were located, from which it has been possible to recognize one building. A number of other post holes at present remain unallocated to any specific structure. However, further work in the area may provide a plan for these. At this stage two phases can be readily recognized, but further subdivisions may be possible when for example, the results of Carbon 14 and archaeomagnetic dating are available. Therefore the details in the definitive report may vary considerably from those outlined below.

Phase I. (Fig. 13)

GRID 9

During this phase, the V-shaped ditch served as the eastern perimeter to this small enclosure. The ditch itself was regularly cut throughout its length, being approximately 2 metres wide and 1.4 metres deep. The fill was relatively free from debris, but some silt had accumulated at the bottom; at various places this contained small amounts of slag and charcoal, all providing evidence of industrial activity. At some later stage (possibly prior to Phase II), the ditch appears to have been backfilled with clay and soil, this material probably being derived from the original bank. To the west of the ditch 28 post holes and post pits were located, from which it was possible to recognize the remains of a single rectangular building measuring approximately 15 metres by 7 metres. This was outlined in plan by 18 post pits, all of which show remarkable uniformity in that they are approximately 76 cms. in diameter and 84 cms. deep. The pits were generally cylindrical in shape with a flat base. Each post, apparently square in section, was positioned on a base made of large pieces of tap slag (a by-product of the smelting process) and supported

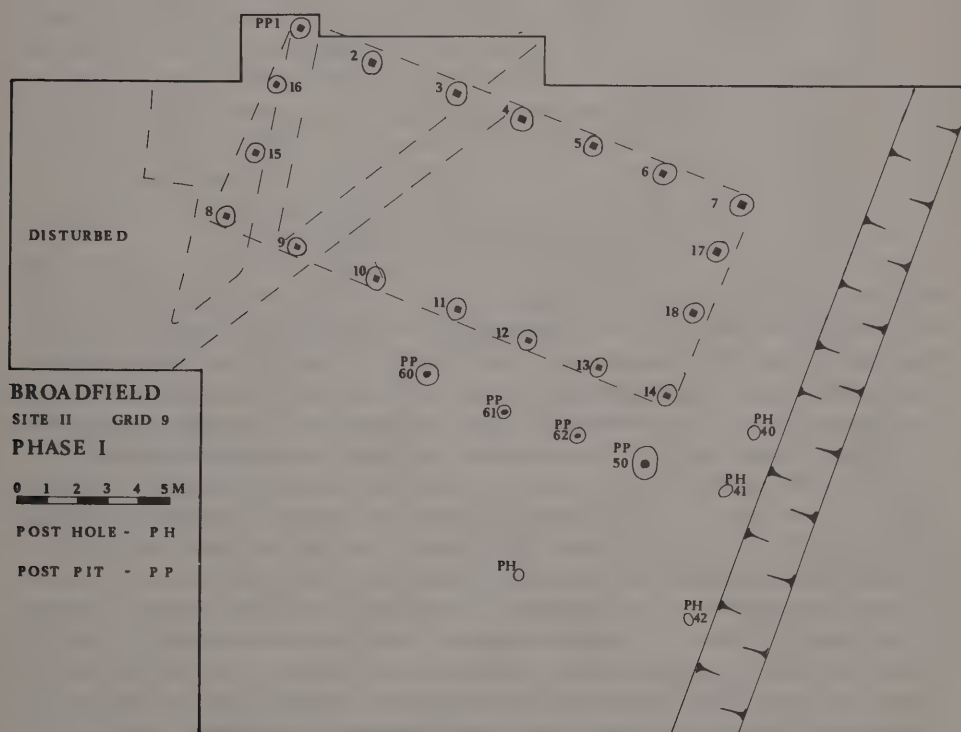


Fig. 13 Crawley 1974. Simplified plan of Grid 9, Phase I showing timber building.

in position by a packing consisting of several alternate layers of clay and slag. This is shown (Fig. 13) by post holes numbers 1-18. The superstructure of the building and floor, if any, have apparently been removed by deep ploughing.

Some 2 metres to the south of the building, a series of post pits was positioned to the long axis and may prove to be a composite part of the structure (Fig. 13, posts pits numbers 50, 60, 61 and 62). However, with the exception of post pits numbers 60 and 61, they are all of varying sizes and construction.

Three post holes, numbers 40, 41 and 42, were positioned along the western edge of the perimeter ditch, each being approximately 38 cms. in diameter and tapering to a base cut some 76 cms. into the clay. These may represent some further form of delineation of the site, or revetment to the low bank described above, but this seems most unlikely as only these three have been found on the entire eastern section.

Phase II (Fig. 14)

GRID 9

Phase II post-dates the building in this area — evidence for which consists of a trapezoidal pit measuring approximately 5.5 metres by 2.25 metres and tapering from east to west to a depth of 1 m. The pit was filled with several layers of differing materials, the uppermost being of interest as it contained a large quantity of burnt clay fragments, many of which had striations and may possibly have been derived from the building superstructure. The pit was evidently later than the building because it cut through the sealed post holes numbers 17 and 18. On its southern side, the pit was connected via a V-shaped gully to a ditch discovered earlier on Site I. The gully measured approximately 46 cms. wide at the top, tapering to a flat bottom measuring 15 cms. Throughout its length it was cut to a fairly consistent depth of approximately 53 cms.

Within the building, though probably not contemporary with it, the bases of five smelting furnaces and a small smithing hearth were discovered. Unfortunately, the remains of these structures were very fragmentary. Nevertheless it was possible to identify three of the smelting furnaces as being of the classic "wealden" type (Fig. 14). In their original state, they would have consisted of a free-standing cylindrical clay superstructure measuring approximately 1.25 metres high and would have had facilities, via an aperture known as the frontal arch, for slag-tapping and the application of forced draught. In the bloomery process, the slag is tapped in a molten state, in this case, into an oval pit connected to and in front of the furnace. They therefore correspond to Cleere's Group B.1.i (Cleere, 1972) and are similar to furnaces which have been discovered at Holbeanwood (Cleere, 1970). The remains as excavated, consist of a hearth formed in a bowl-shaped depression lined with grey/black puddled clay, frequently showing striations which are thought to provide evidence of fettling. From most of these furnaces, portions or the whole of the so-called slag "furnace base" were removed for examination. The average dimensions of the furnaces were 68 cms. wide and 2.36 m. long including tapping bay. In front of the furnace there was normally an oval-shaped pit, the fill of which consisted largely of fragments of burnt clay superstructure, pieces of tap slag and slag

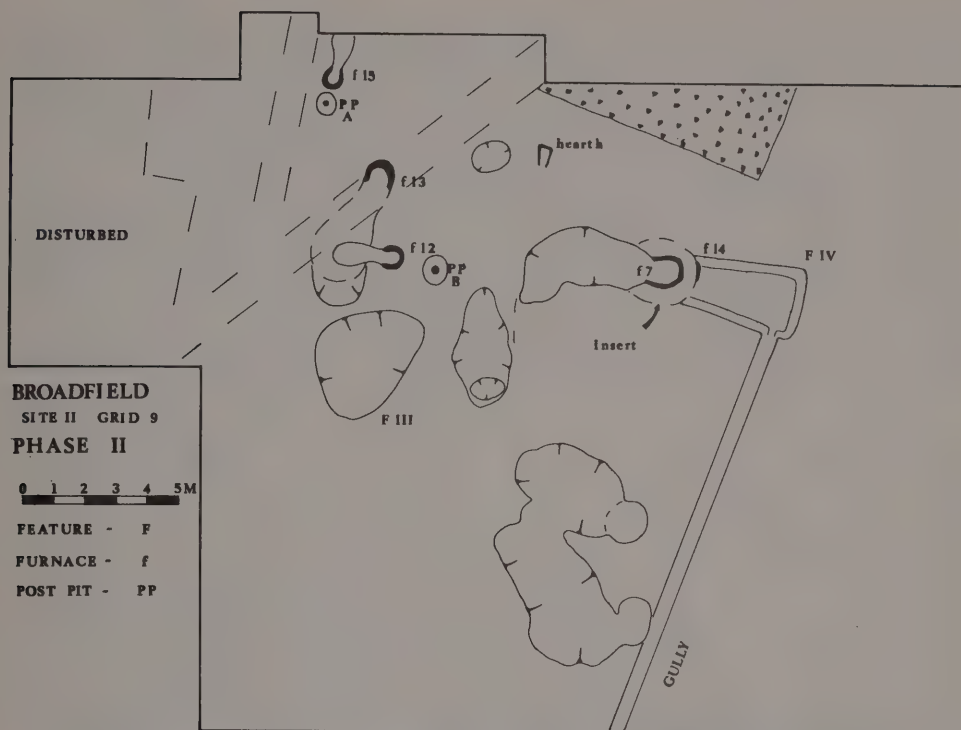


Fig. 14 Crawley 1974. Simplified plan of Grid 9, Phase II showing layout of furnaces.

fingers. However, in the tapping bay of furnace number 15 fragments of *tuyères* were discovered. The *tuyère* served as a valve, allowing a blast of air to be introduced into the combustion zone of the furnace. The Broadfields examples are double *tuyères* and as such are of special interest because this type seems to be peculiar to the Weald. They are manufactured out of clay and moulded into a “trumpet-mouth” form. Each has two converging holes approximately one inch in diameter starting inside the trumpet mouth. Examples of this type of *tuyère* have been discovered at Crowhurst Park, Byres Farm and Bardown and form Cleere’s type B (Cleere, 1963).

During the Roman period, the iron of the Weald was exploited by what now appears to be at least two main groups. A “coastal” group which included Holbeanwood and Bardown, was apparently connected with the Roman fleet, as tiles stamped with the letters CL BR (Classis Britannica) have been found at Bardown and Cranbrook (Brodribb, 1969). Broadfields is apparently part of a “mid-Wealden” group centred on the London to Lewes and London to Brighton road system.

It was also possible to make the provisional identification of another furnace from within the group discovered in Grid 9. The remains suggest that it originally had a domed

superstructure. Single examples of this type of furnace (furnace no. 7, Plate XIV) have been found in the Weald at Pippingford Park (Tebbutt and Cleere, 1973) and Minepit Wood (Money, 1974), both dating from the mid first century A.D. The remains discovered at Broadfields consist of a furnace base and tapping bay, measuring approximately 2.1 m. wide and 6 m. long including tapping bay. It appears to have been equipped with facilities for forced draught and slag tapping and as such will comply with Cleere's classification Group B.1.ii. (Cleere, 1972).

Apparently after the trapezoidal pit (feature no. IV) was backfilled, the furnace no. 14 was constructed at its west end, this was probably of the "wealden" type. At a later date, most of this was removed and the dome furnace, furnace no. 7, was constructed here on a prepared clay insert. This was flanked on both sides by sandstone blocks. Charcoal from the base of this furnace provided material for a Carbon 14 dating, the uncorrected result of which is as follows: 50 ± 60 a.d. A small hearth was located immediately north-west of this furnace, which consisted of a truncated wedge-shaped depression line with slag and clay. There was no evidence for tapping facilities or superstructure. Around this feature and immediately to the south of it, the compacted debris of smithing activity was discovered.

To the south of the building several irregular shaped pits were found. Without exception, these were filled with separate layers of slag and furnace superstructure. Feature III is probably the most interesting, in that the tip line of the debris suggests it was filled from the north-eastern side, possibly from furnaces numbers 12 and 13. It is thought that all of these pits were originally dug to obtain clay which was used in the construction of these furnaces. The absence of silt, and the fact that the fill consisted of the by-products of the smelting operation strongly suggest that they were backfilled as soon as the furnace came into operation.

Immediately to the north of the building aligned to its long axis, was a large, rectangular metallised area. It consisted primarily of tap slag and furnace debris and may well have served as some form of vehicle park, which seemed to have been repaired on a number of separate occasions. The south-east corner of this is shown on the top of Fig. 14.

GRID 8

Situated to the north of Grid 9, an area measuring approximately 36 m. by 18.25 m. was stripped by Crawley Borough Council employees working under our direction. Controlled sections of which were excavated by members of the archaeological team. In this way, the whole of the hard standing mentioned above, (Fig. 14) was revealed. At the western end of this area, the remains of three small hearths were located.

GRID 1

An insert already located in this area has now been thoroughly examined. It consisted primarily of a square-shaped area of clay approximately 3.8 m. long by 3.5 m. wide and 40 cms. deep. Using this as a foundation, the construction of three smelting

furnaces was possible, all of which correspond to Cleere's Group B.I.i (Cleere, 1972). Originally they would have consisted of a cylindrical shaft recessed into a low bank of clay and often using a communal tapping bay (we were not able to substantiate this as the front portion of the furnaces and tapping bay had been destroyed). The remains consist of a 38 cms. high rear portion of the shaft from which it was possible to estimate a diameter of 69 cms. The base of the furnace, unlike the "wealden" type slopes from back to front. With the exception of Broadfields, there are no known parallels for this type of furnace in the Weald. However, examples are known from Stamford (Tylecote, 1969) and Ashwicken (Tylecote and Owles, 1960). At a later date these furnaces were demolished and a smaller oval insert was constructed above them. A furnace probably of the dome type was constructed from the insert. This differs marginally from that found in Grid 9 in that it had been relined on a number of occasions, thereby causing the orientation of the furnace to move from south to south-west.

GRID B2

To the south-east of the enclosure, an area consisting of 648 sq. m. was stripped mechanically to locate the northern limits of a slag dump. It closely resembles another dump found earlier on the western side of the enclosure, in that the remains consist of a low mound apparently produced by continuous tipping. It was almost certainly robbed of much of its slag to be used as part of the burden in furnaces of the later iron industry in this district. From the base of the slag dump, a number of burnt clay bars were discovered, many of which showed the results of vitrification under oxidizing conditions, and are provisionally identified as being a type of fire bar used as supports inside pottery kilns. (For a more comprehensive description of the use of these, see Corder, 1959).

GRID A2

To the west of Grid I, an area of approximately 140 sq. m. was stripped to the natural clay, revealing four square post pits each measuring approximately 1 m. square. They formed the end row of a building originally located in Grid I. This rectangular building is now known to have measured approximately 14.5 m. by 9 m. Within the structure, fragments of a floor made up of successive layers of burnt clay and unburnt beaten clay, were discovered in association with a horseshoe-shaped oven.

Acknowledgements:

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for their perseverance and good humour, especially Messrs. R. Amos; S. Bracher; C. Pratt, M.Sc.; Miss M. Dillon and finally, my Assistant Director Miss E. Horne for helping with the typing and preparation of this report.

VII. The excavation of a Romano-British, Saxon and Medieval occupation site at Becket's Barn, Pagham, West Sussex.

by VINCENT GREGORY

The site excavated is part of Church Farm Caravan Park. It is only a few hundred metres from Pagham lagoon and the sea. It is low lying and until recently has suffered from serious waterlogging. Becket's Barn is situated on top of a low rise in Moat Field, about 50 m. south-east of the church of St. Thomas à Becket. Moat Field contained the remains of earthworks until about ten years ago when about 1 m. of hardcore was used to level up and consolidate the land for caravan parking (Fleming, 1958, 136).

In the early 1950s Mr. A. H. Collins and Mr. Lindsay Fleming carried out excavations at Becket's Barn (Fleming 1958, 135). Their trenches were small and only a limited area was excavated. They found floor levels in the Barn, a stone structure to the south of it, various foundations in the area to the north-east of the Barn, a cobbled surface and Saxon and Medieval material. Fleming presumed the Barn to be a rectory to which he gives a reference which dated to the end of the 13th century (Fleming, undated, 74).

There are two notable finds in the vicinity of the Barn. One is a Saxon cinerary urn of the 6th or 7th century, which came from the churchyard (Collins, 1955) and the other a Roman cremation urn which came from the centre of Moat Field. The Barn itself is a stone structure, now roofless, but incorporating traces of late 12th century or early 13th century masonry. It is a scheduled building, but planning permission was granted early in 1974 for its conversion into a restaurant. The owner kindly gave permission for the Sussex Archaeological Field Unit to excavate.

Four areas were excavated (Fig. 15) in order to obtain a detailed plan of the site, and most of the interior of the building was excavated (Area 1). In places the depth of stratigraphy was over 1.50 m. In the lower levels the area was waterlogged and this made it impossible to take all the area down to natural, though about 50% of the area was totally excavated.

In Area 2 a small cutting, 9 m. x 10 m., was excavated north of the Barn. This had 15-30 cms. of recently dumped material overlying the Medieval levels and was severely damaged by the levelling. About 50% of this area was totally excavated.

Area 3 was a cutting 18 m. x 7 m., south of the Barn. This had a metre or more hardcore overlying the archaeological layers.

Area 4 was a cutting 19 m. x 7 m. some 35 m. north of the Barn. Only 20% of this was taken down to the natural underlying sand.

The Medieval occupation

At the west end of Area 1 the Barn proved to have several superimposed mortar floors which covered about a third of the interior. The floor was separated from the rest of the area by a gravel filled 'robber trench'. Two of the floors were relatively undamaged and still had a few glazed floor tiles *in situ*. Contemporary with the upper floor level was a rectangular pit 1 m. x 1.5 m. and 1 m. deep, which was filled with five layers of large laid stones separated one from another by mortar and gravel. This pit lay in the centre of the upper mortar floor. It is too substantial for a hearth, and exhibited no evidence of burning. It therefore possibly represents some form of support for an upper storey. The floor levels are dated by pottery to the later part of the 13th, or the beginning of the 14th century. The remainder of the Barn had no surviving floor levels and was made up of 50 cms. of homogenous, heavy brown clayey soil with a thin layer of charcoal and grain. This portion of the structure may have been solely used as a barn.

In Area 2 a robbed wall ran north-south at right angles to the Barn. There was no way to date this feature, but it was possibly robbed at a similar period to the 'robbed wall' in the interior of the building as the fill of both trenches is identical. Several small post holes of medieval or later date were also noted in Area 2, but they form no coherent plan.

In Area 3 the walls excavated in 1954 by Lindsay Fleming were re-excavated. Unfortunately the whole of this area was disturbed in the upper layers by recent excavation and 19th century cart ruts. Lindsay Fleming had excavated narrow trenches along the length of the walls and had badly damaged areas adjacent to the walls by digging small trial holes. The 19th century cart ruts in places went down to the natural clay, leaving 50% of the area too disturbed for interpretation. Under the wall a ditch, 1.5 m. wide, turned a right angle. This ditch also ran under the Barn itself and came to a butt end in Area 2. The ditch is probably late Saxon in date. Between the ditch and the overlying wall was a small gully containing charcoal and carbonized grain for which a C-14 date is being obtained.

In Area 4 there were two Medieval gullies, a well and several small rubbish pits of 14th century date.

The excavation has revealed that the Barn was in part used as a dwelling, with the

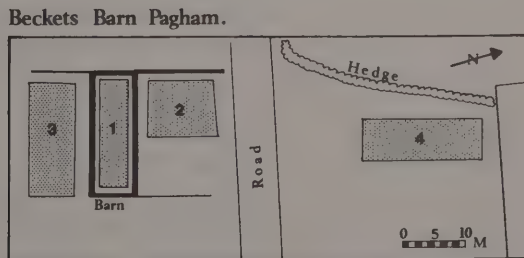


Fig. 15 Pagham 1974. Block diagram of Becket's Barn. Areas excavated are stippled.

possibility that it had an upper storey at some stage in the 14th century. The structure to the south of the Barn in Area 3 is of uncertain date. The features in Area 4 are possibly related to the Barn complex, but are more likely part of a much larger domestic complex.

The Saxon occupation

Perhaps the most interesting information from the whole excavation is the large group of Middle Saxon pottery. A midden deposit covered most of the western ends of Areas 1, 2 and 3. Unfortunately no structures relating to the midden were found. A cobbled track ran north-south across Areas 1, 2 and 3, which was traced for about 25 metres. The track was made of large flint cobbles and was several flints deep in the middle and 2 metres wide. (Plate XV). The midden deposit in part overlay the cobbled track and both in turn were cut by a small Saxon enclosure ditch mentioned above. The Saxon finds ranged from the late 7th or early 8th century to the 9th century A.D.

The Romano-British occupation

A re-cut Romano-British drainage ditch ran north-south under the cobbled track. This was excavated in Areas 1, 2 and 3. The associated finds were mid 2nd century in date. There was also another ditch in Area 4 running east-west and of approximately the same date.

THE FINDS

A. MEDIEVAL

There were few finds of this date in and around the barn. Area 4 produced most of the Medieval material from the complex of pits and gullies. The pottery is locally manufactured and is similar to the Orchard St. kiln types (Down and Rule, 1971, 153) and the Binstead kiln excavated by C. J. Ainsworth and K. Barton. This puts the bulk of the medieval pottery into a late 13th-mid 14th century date range.

B. SAXON

The midden produced many forms of Saxon pottery. These appear to be Middle Saxon, with a date range perhaps between the end of the 7th century and the beginning of the 9th century. All the pottery is flint tempered, but the size of the flint temper varies from very large to medium. The fabric is often pitted with small holes which in many cases seem to be the remains of vegetable matter, perhaps grass and seeds. None of the pots are very large and most are round bottomed. The surface finish is quite smooth in many cases, but shows no evidence of burnishing. The temperature of firing cannot have been high and must have been variable. (Fig. 16).

The dating of the pottery is somewhat difficult. The only decorated piece is rather earlier looking than anything else in the group. The pottery as a whole is similar to those wares found at Medmerry Farm, near Selsey (White 1934). This would suggest that the pottery group is probably of the 8th century although this dating must be considered tentative.

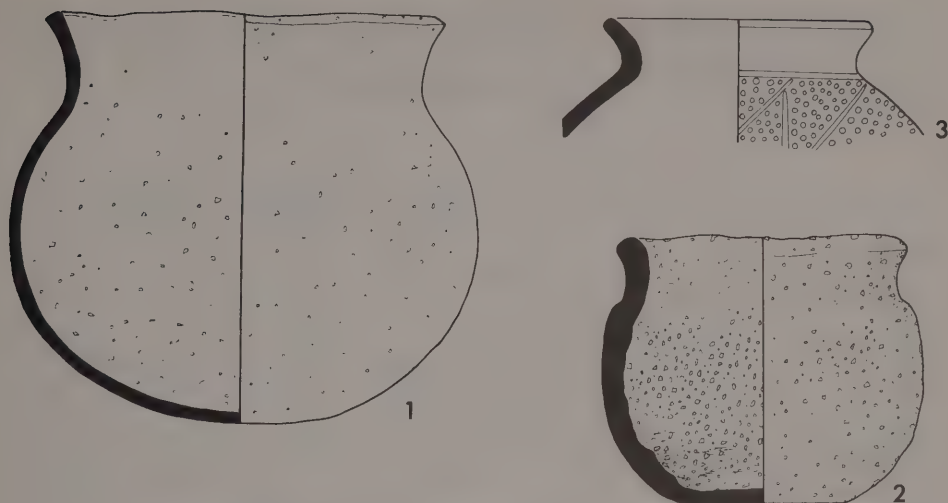


Fig. 16 Pagham 1974. A group of 8th century A.D. pottery from Becket's Barn. ½ scale

C. ROMANO-BRITISH

Several 2nd century Samian forms were found in the drainage ditches, e.g. forms 31R, 27 and 33. There is some coarse ware from the ditch which does not contradict this date. Colour coats were present, but only in a very poor state of preservation. One eroded piece of mortarium was found under the cobbled track.

In conclusion it may be said that Becket's Barn is almost certainly not an archbishop's palace as has sometimes been suggested. It might well be part of a larger complex of buildings, but the excavated evidence does not support the palace theory at all. The building is simply part of the Medieval village of Pagham, or perhaps the barn of the rectory which at some stage in the 14th century was used as a dwelling.

There do appear to be breaks in occupation both between the 8th century and the 12th century; and again between the 2nd century, and the 8th century. It would be unwise to assume that this is true for Pagham as a whole. There are, or were, many earthworks in Moat Field of uncertain date, which in part underlay 'Becket's Barn', but no datable finds were recovered. Perhaps this represents the gap between the 8th and 13th centuries.

The Place-Names of Sussex states that Pagham is first mentioned in 680 A.D. This is quite likely and backs up the find of a 6th-7th century Saxon Cinerary Urn from the churchyard. (Collins, 1955). The midden deposit excavated therefore can be seen as evidence for a Saxon farmstead or village.

The break in occupation on the site between the 2nd and 7th centuries could be attributable to many factors, perhaps the most likely of which is that the area became

waterlogged. Much evidence was found for waterlogged deposits in the form of thick, green silt which separates the Roman features from the Saxon levels. Obviously the area has always had problems with water-logging right up until the present decade, when the surface of the land was raised by a metre.

VIII. The excavation of the Church of Saint Nicholas. Angmering, West Sussex.

by OWEN BEDWIN

Following notification from the Department of the Environment of planning application for six bungalows on a site in the village of Angmering in West Sussex, the Unit undertook a short trial excavation in September and October, 1974, to find the missing church of St. Nicholas. The site, a thickly-grassed field in the centre of the village, contained only one relevant clue; two large pieces of flint masonry in one corner. However, it had always been believed locally that the church was there beneath the surface.

On the third day of the excavation, a flint wall was found, (it proved eventually to be the western end of the nave), and such was the extent of local volunteer assistance that the dig far transcended the bounds of a "trial" excavation, and almost all the masonry was uncovered over a period of five weeks. The church was revealed as a sizable structure in which several building phases were clearly discernible. The ground plans of the successive stages are shown separately in outline in Fig. 17; the ground plan of the church as a whole is shown in Fig. 18. The main building stages are summarized as follows:—

- (i) A comparatively small church about 15 metres long, with an offset apsidal chancel, choir and short nave; although no pottery was found in a context which would unambiguously provide a date, the shape alone assigns this stage to the late Saxon period.
- (ii) The church was subsequently enlarged in early Norman times by demolishing the apsidal chancel, and replacing it with a larger rectangular chancel. The nave was also extended.
- (iii) A square porch was added onto the west end of the nave, and a chapel was built along the south side, running the full length of the nave. Both these additions lack buttresses, indicating a date before c. 1250, but they may not have been simultaneous. Belonging to this phase also, is a substantial wall built immediately alongside the hitherto rather flimsy end wall of the chancel, presumably in order to bolster the latter, or perhaps to replace it.
- (iv) The final addition was a tower on the south side, necessitating the prior removal of part of the south chapel of stage (iii). A south tower is rather unusual, since most of them are found at the west end of a church. Its foundations were far more massive than those of any other part of the church, and it also seems to have been considerably later, dating from perhaps the 15th century.

CHURCH OF ST. NICHOLAS, ANGMERING, W SUSSEX.

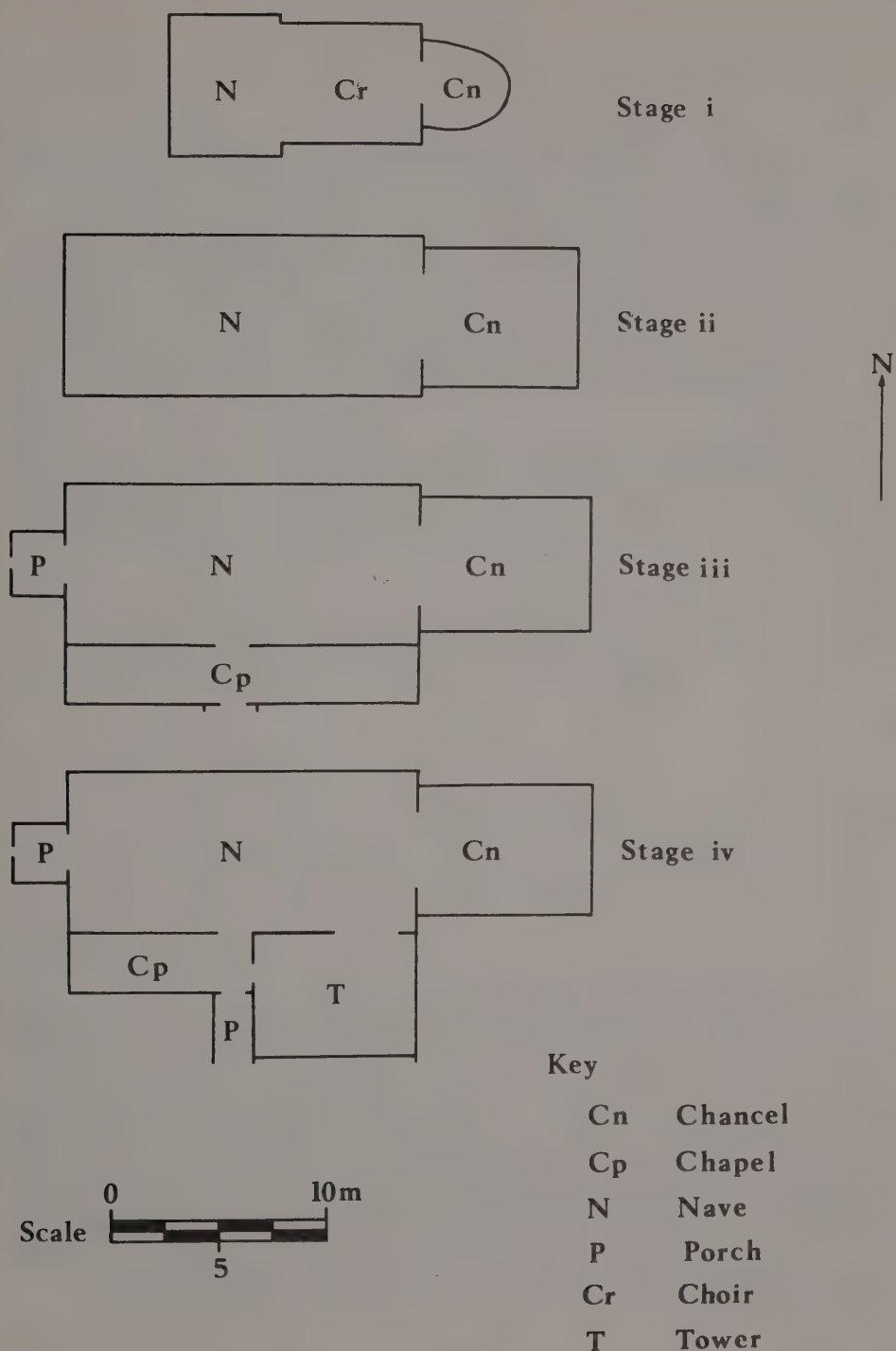


Fig. 17 Angmering 1974. Block diagram showing the development of the Church of St. Nicholas.

CHURCH OF ST. NICHOLAS, ANGMERING, W SUSSEX.

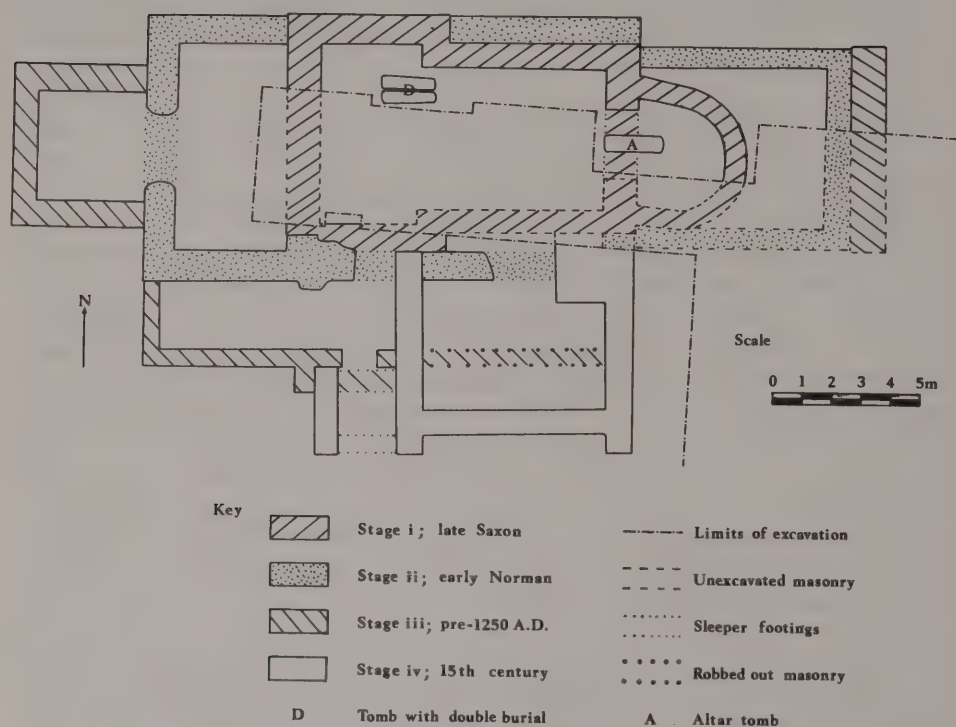


Fig. 18 Angmering 1974. Ground plan of the church of St. Nicholas.

The demise of the church seems to have come soon after the death of the last rector, which occurred in 1593 A.D., according to parish records. The archaeological evidence points convincingly to the fact that the church was systematically demolished down to ground level c. 1600 A.D. The pottery recovered from the demolition debris supports this view, as does the comparative scarcity of roofing material (Horsham slab). Normally, a building allowed to decay over a long period sheds a great deal of its roofing material, which is then found fragmented in great quantities, but this was not the case here.

The masonry was of flint throughout, held together by mortar of highly variable quality; the early Norman mortar of stage (i) was particularly poor. Also, much of the Saxon footings consisted of tightly packed but unmortared flints. Worked green sandstone was used on most internal and external corners above foundation level.

The small finds

From the extensive mortary demolition debris, particularly within the nave and south chapel, came large numbers of fragments of painted wall-plaster, usually a rather subdued red or apricot in colour. This indicates that the interior of the church was once decorated with murals in much the same way as many of the early churches of Sussex still extant (e.g. Clayton). There were even a few examples, (from the nave only), in which the paint had been whitewashed over, and the whitewash had then peeled off to reveal the original colour beneath; a similar process has been noted in other Sussex churches, e.g. at Hardham, where the murals were covered by plaster.

A great deal of painted medieval glass was found too, especially in the debris lying within the chancel; almost all the fragments were very small and highly friable. A considerable number of glazed floor tiles were recovered; mostly plain (cream, light green or dark green), but quite a few decorated, with a cream pattern on a red background. In the later stages of the church's life at least, the floors seem to have consisted of glazed tiles laid on a thin skin of mortar, which itself rested on brown clay. During demolition, the tiles were ripped up, more often than not breaking the mortar beneath. This left a layer of pulverized mortar, which was often difficult to differentiate from the very mortary demolition rubble immediately above it. In a few places, however, the mortar had survived intact, and there were even two areas where tiles were found still mortared in; i.e. around the altar tomb (see below), and in the doorway between the south tower and the nave. In both instances, the outline of tiles which had been removed was distinctly visible in the surrounding mortar.

Burials

Two well made tombs of shaped chalk blocks lined with hard, white plaster were found within the church. One, an altar tomb, contained the complete skeleton of an adult male, with the badly corroded remains of a pewter chalice over the abdomen. Only the relatively thick stem of the chalice had survived; the rest was in fragments. The tomb appears to have been too small for the body, and the plaster inside has been chipped away at each side to accommodate the arms (Plate XVI).

The other tomb, beneath the floor on the north side of the nave, contained a double burial, in which the skeletons were separated by a thin vertical wall of chalk blocks.

There were several other unmarked burials inside the church; only one was in the nave. For most of the others, a case could be made for these having been originally outside the church, before the various later additions. Some of these burials had resulted in quite marked subsidence in the floors which were laid over them, and in the case of those within the Norman chancel the foundations of the Saxon chancel had been cut through when the graves were dug (Plate XVII).

Outside the church, skeletons were found more or less wherever the trowel went into the ground. The main graveyard seems, unusually, to have lain to the north of the church.

IX. The excavation of a medieval tenement at Winchelsea, East Sussex.

by ANTHONY KING

Excavation was carried out on the proposed site of public lavatories in German Street, Winchelsea, for two weeks in March and April, 1974.

The site was unoccupied until the laying out of the town under Edward I in the 1280s. Soon after this the first building was set out. This consisted of a hall running north-south and a cross wall to the east. Most of the remains are foundation trenches except for the front wall which was re-used in the later building. A rent roll of 1292 shows that the plot was possibly held by Stephen Aurifaber and it could be that this building has some connection with his trade, although there is no indication of this. Towards the end of this period the front wall was rebuilt with a chamfered offset placed on the old foundation, and a doorway was inserted with a re-used Caen stone doorstep which can be dated to the close of the fourteenth century. (Fig. 19).

It is possible that there was a change of ownership shortly after this, because a major change in the appearance of the house occurred. There are no signs of decay in the old building or of destruction, although it is possible that any traces were swept away with the building of the new house. The back and north end of the old hall were taken out and replaced by a conventional hall house, with quasi-aisle, cross passage and service. An unusual feature is a mortar platform at the east end of the cross passage, cutting into the service. Its top surface was probably tiled. If there is a cellar to the south this could be a back entrance associated with it. It was later cut across by a continuation of the service wall. Brick entrances to the service and front door were found. On the east side of the hall, after the removal of the early hall's cross wall, another was built to the north. However, later in this period a more substantial wall was built even further to the north with an internal partition of stone. This represents the end of a sequence whereby the open space behind the main building was gradually filled up with extensions to the house. Out to the front of the house a peculiar feature was found. The foundations of the old wall of the hall were re-used as the main wall of the new house. However, the doorway was blocked up and moved to the cross passage entrance position, normal to such houses. As this was done, a small, probably wood-frame bearing, wall was built along the outside of part of the frontage with a pavement running the full length outside this. This small wall could be a shop front since the house occupied a corner plot next to the market: an alternative to this is an external staircase. Further south near the service outside wall the old wall had subsided about 25 cms., which evidently caused problems for the new house since a relieving arch was inserted during the occupation of the building. A small trench dug about 10 m. to the south of the main trench revealed the continuation of the front wall and its termination although it was too small to reach any definite conclusions.

A cutting for the lavatory's drain revealed the corner of substantial foundations, possibly for a cellar and, by accordance with Homan's scheme (1949, 30 ff.) it could be stated that this represents the corner of the next plot, although this has still to be verified (the site is on the south-west corner of Insula 19). The plot extends some distance to the

WINCHELSEA PERIOD PLAN

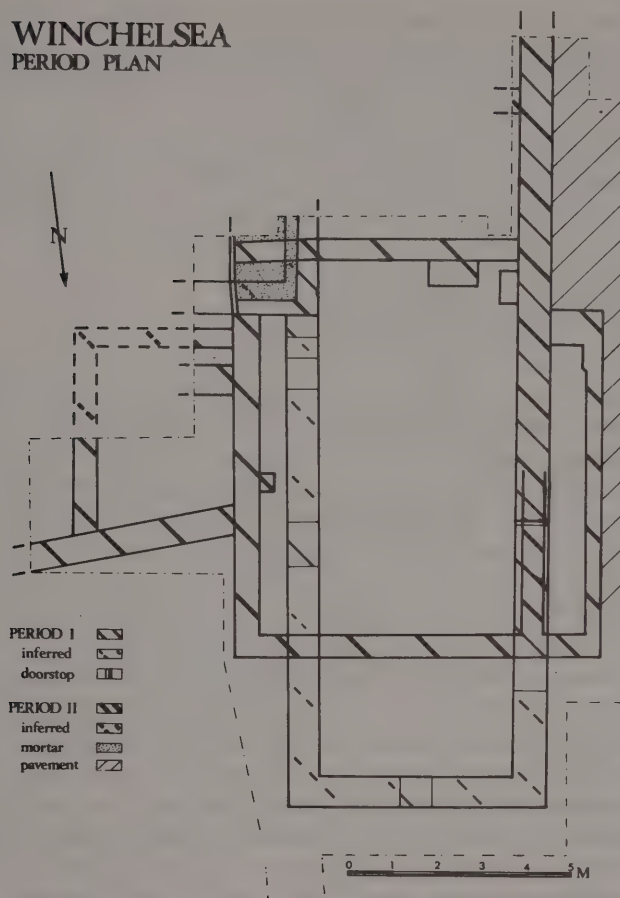


Fig. 19 Winchelsea 1974. Period plan showing development of the Medieval tenement.

south of the excavation. The early hall seems to be an adjunct to a possibly more important building further south, whereas the second building could be more self-contained and represent a sub-division of the plot. This is the theory at present until there is further investigation of this particular area, but it would be consonant with a sub-division arising from a change in tenancy.

The history of the site subsequent to the destruction of the house, the dating of which is still uncertain but is likely to have been before the end of the fifteenth century, by which time the town was rather decayed due to silting of the harbour and contraction of trade, is that the front wall was used as the footings for a dry-stone park wall, the park was certainly in existence early in the seventeenth century – which in turn was knocked down and at length replaced by the iron fence which encloses the park today. As a

consequence of the site's enclosure, little robbing of the walls has taken place below ground level except in early Victorian times along the front wall, presumably after the removal of the stone park wall. The site is now occupied by a public lavatory and layby.

Acknowledgements:

I should like to thank David Martin and Val Turnbull for their help in preparing this report.

X. Excavations at Lewes, East Sussex.

By DAVID FREKE

The extent and focus of the Burghal Hideage town of Lewes is not known and its defences have never been positively identified, but the Burghal Hideage itself may give some idea of the size of Saxon Lewes, for it has been shown that a measure of one hide equals one man equals $4\frac{1}{2}$ feet of defences. (Ralegh Radford, 1970). The Hideage of Lewes is 1300, (Hill, 1969) which gives a length of $1,787\frac{1}{2}$ yards. Although the length of the Medieval town wall, as shown on the Ordnance Survey maps, is about one and a quarter miles, there is evidence from other Saxon towns, such as Wallingford and Cricklade, to suggest that later medieval defences sometimes followed the line of Saxon walls. (Ralegh Radford, 1970). The Sussex Archaeological Field Unit, as a rescue Unit, looked for sites in threatened areas of Lewes where excavation could test this hypothesis, as well as clear up some doubts about the precise line of the medieval wall. With the co-operation of Lewes District Council and the Lewes Archaeological Group it was decided to open two trenches in the north-east of the town where re-development allowed the investigation of these problems, and a third trench was dug to establish the date of an enigmatic ditch and bank, the so-called 'Fosse', in Lancaster Street, where demolition had presented a rare opportunity for scientific excavation. (Fig. 20). The north-east of Lewes is the only area of the town to have produced quantities of Saxo-Norman pottery, although it was recovered in circumstances which precluded the determination of the character of the site, particularly whether it was an urban dwelling site. (Norris and Thompson, 1963).

Brook Street South (Fig. 21)

The two trenches north and south of Brook Street were opened specifically to check the traditional line of the town wall at this point and to test the hypothesis that the Saxon defences may have formed the foundation of the medieval wall. The plan of the earliest features of the Brook Street site shows that at no time was there a defensive bank or wall in the area of our trench, and the few early features there would seem to indicate that the area is actually outside the urban settlement. Recent demolition and levelling had removed perhaps half a metre of soil leaving naturally deposited sands and gravels exposed in the north-east quarter of the site after the stripping of the modern car park

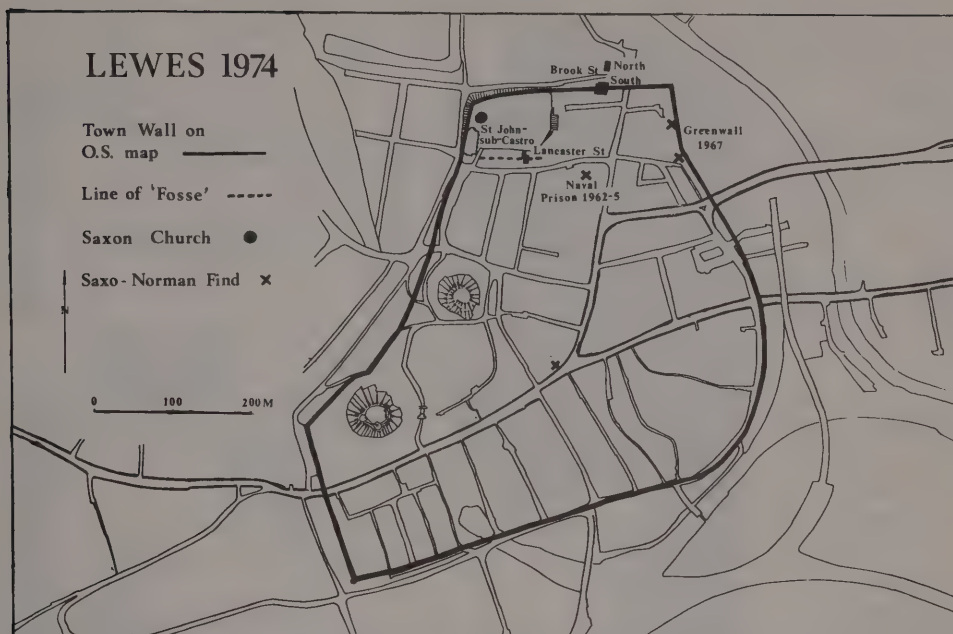


Fig. 20 Lewes 1974. Plan of the Medieval town wall and Saxon finds in relation to the excavated areas.

surface. Two pits and two gullies cut into this produced a few sherds of Saxo-Norman pottery, while a shallow, irregular scoop occupying the south-eastern half of the site and cut into the natural sand yielded many small fragments of 14th century pottery. The only other period represented in the finds is the last 200 years, when no less than eleven cess-pits and five other pits of uncertain function were dug.

Brook Street North (Fig. 22)

A section drawn across both Brook Street sites from north to south demonstrates the much greater depth of the natural in the Brook Street North site, despite the fact that its lowest level may not have been laid down earlier than the 12th century A.D. The 2.4 m. difference between the top of the natural in the Brook Street South site only 13 m. away, and the fact that this difference is almost entirely made up of sand and gravel over the underlying chalk, indicates that Brook Street probably follows the line of a river terrace. It is suggested that it is this terrace which has led to the traditional belief that the line of the town wall is in the vicinity of Brook Street (e.g. Dunvan, 1795), and the Greenwall to the east may be a similar red-herring. (Fig. 20).

The earliest level of the Brook Street North site could not be dated; it consisted of a level layer of rough flint cobbles which covered the whole trench except where cut by 19th and 20 century disturbances. It was laid on a layer of grey clay only 2 to 3 cms.

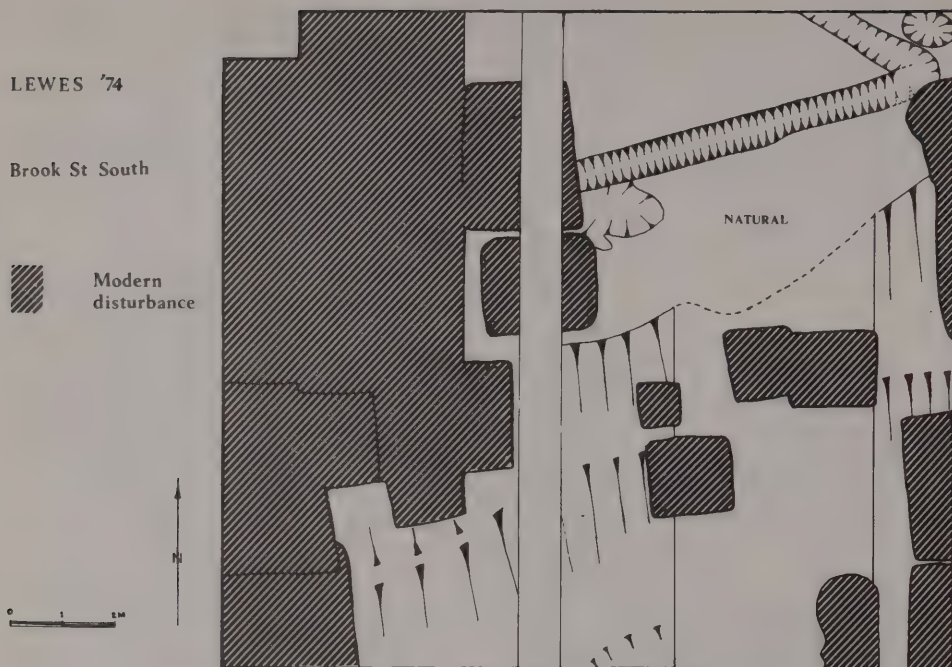


Fig. 21 Lewes 1974. Plan of Saxo-Norman features in Brook Street South.

thick immediately above the natural chalk. A flint cobbled road had been made in an east-west direction across the northern end of the trench on a foundation of gravel half a metre thick above the earlier surface. A similar thickness of organically rich clay sealing the rest of this early surface suggests a long period of flooding during which the road was used long enough for a single track to have been worn down the middle. This track was itself flooded in the 14th or 15th century and went out of use, being covered by 25 cms. of organic silt. The next evidence of human use of the area was provided by an extensive dump of upwards of a thousand cattle horn-cores deposited in the 18th century. Not much later the area became the site of an industrial process which involved the construction of water-tight pits and drains. At first the pits were merely clay lined holes and the drains three wooden boards clamped together with iron brackets and covered with thin stone slabs. Later brick lined pits with brick paths and drains were constructed with a brick building on wooden piles. (Plate XVIII). A barrel set in one of the brick pits of this period corresponded to a similar sized barrel associated with an earlier period. There were at least three phases of construction. The site is known to have belonged to a tanner in the late 18th and early 19th centuries (J. Houghton, pers. comm.) and the features are relevant to the tanning industry. The entire complex went out of use and was

LEWES '74

Brook St sites

north

south

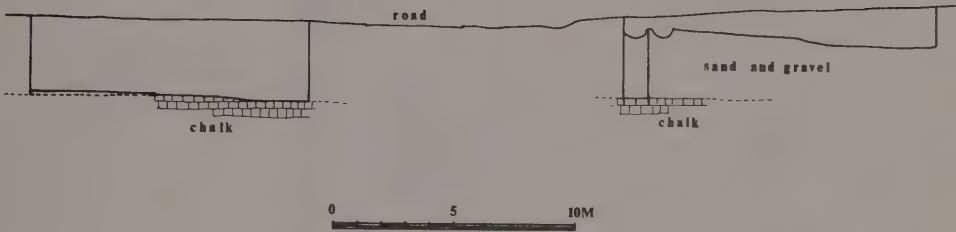


Fig. 22 Lewes 1974. Profile between excavations to the north and south of Brook Street indicating the existence of a natural terrace.

filled in before the end of the 19th century. The land was then deliberately raised by over a metre and the stables which stood until eight years ago were built.

Lancaster Street (Fig. 23)

The so-called 'Fosse' to the north of Lancaster Street proved to be too wide, too deep and too close to the road to be completely sectioned and the demolition of the houses which formerly stood on the site had entailed the destruction of much of the bank. Despite this, enough evidence remained to show that the bank had been built in the 12th century and had been reveted, and there was no evidence to suggest an earlier date for the ditch. The bank encloses the churchyard of Saint-John-sub-Castro, originally a Saxon church, but very few Saxon or Saxo-Norman sherds were found. The ditch is very deep — at least 8 m. below present road level — and the section shows that the bank was probably pushed into the ditch in the 13th century (Layer 16), after which it was slightly recut, perhaps as a drainage gully (Layer 15), in the 15th or 16th century. (Fig. 24).

The 12th century fortification of a churchyard would seem to indicate the period of anarchy associated with Stephen and Matilda, when local feuds were pursued under cover of civil war, but as yet there is no documentary evidence to support this suggestion.

Apart from the discovery of the 14th century track north of Brook Street, and the tanning structures, the evidence from the Brook Street sites is mainly negative, showing as it does that the town wall does not follow the traditionally accepted line. The discoveries at the Greenwall site in 1967, which might seem to confirm the traditional line, were ambiguous, for although Saxo-Norman pottery seems to have been found associated with a bank, the 'ditch' was neither bottomed nor could its other, outer, lip be proved to exist because of the proximity of the Phoenix Ironworks. (Thompson, 1967) It is a possibility that the Greenwall is a remnant of the same terrace as that found in Brook Street and the town wall turns west up the hill much nearer to the Eastgate than previously expected.

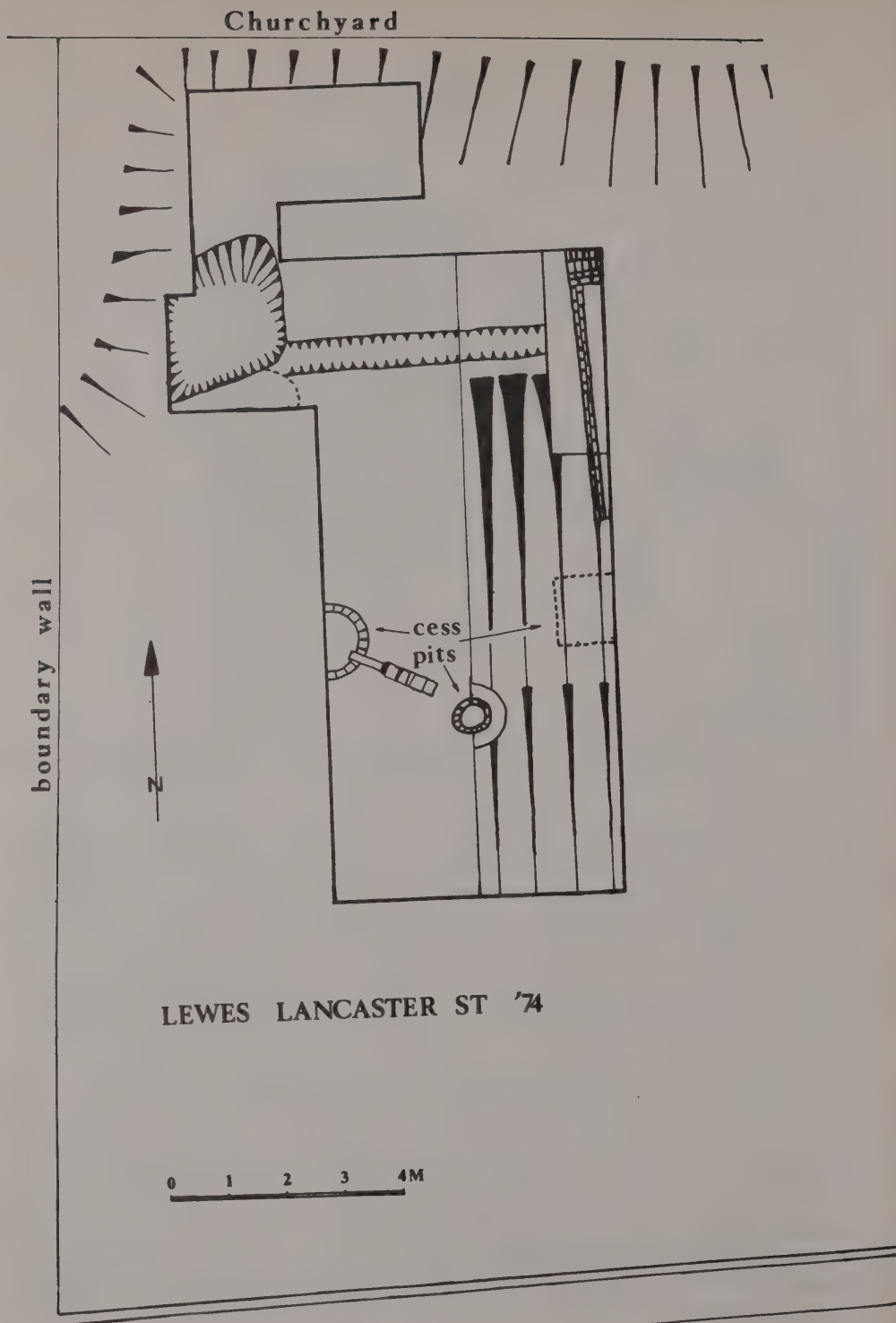


Fig. 23 Lewes 1974. Plan of Lancaster Street excavations.

LEWES LANCASTER ST. '74

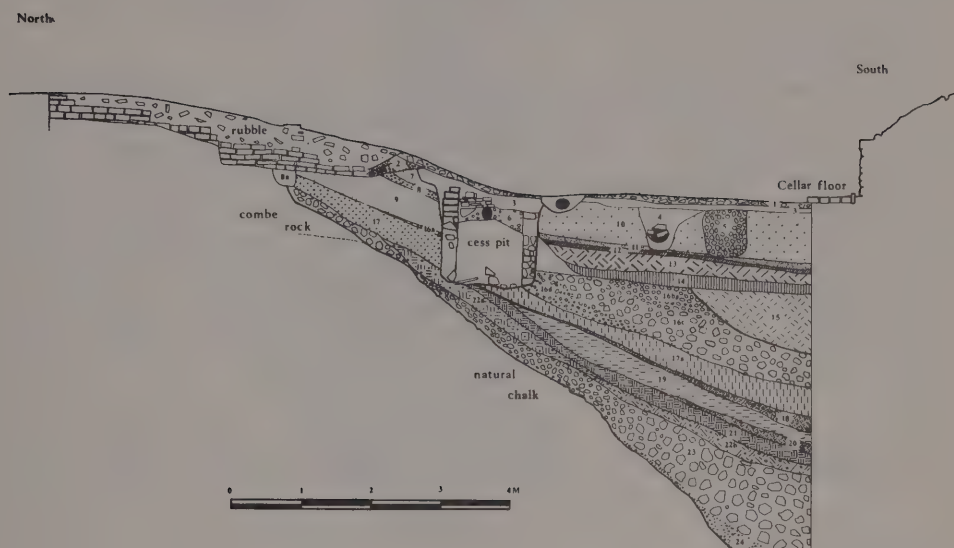


Fig. 24. Lewes 1974. Section of the "fosse" in Lancaster Street.

This suggestion is supported by the results from the Lancaster Street site. It had been a puzzle as to why the churchyard of St. John-sub-Castro should have been a fortified position *within* – supposedly – a walled town with a strong castle, a puzzle which was not solved by the traditional designation of the fortification of the churchyard to a pre-Norman period, as the site of the Saxon Burgh or a Roman Camp, because the bank and ditch were clearly features in the medieval period and their function in that context remained problematic. However, the possibility that the churchyard was fortified in a period of civil war and anarchy, and previously neglected evidence (Lower, 1852 and Horsfield 1824) that it faced uphill *against* the castle, and so did not operate as an outpost of the main defences, all seems to point to it being positioned *outside* the town. This conclusion is supported by the evidence from the Brook Street sites, as outline above. Very shortly after the bank in Lancaster Street had been raised in the 12th century it was pulled down again in the 13th century, a period for which we have documentary evidence of defensive work being done. The possibility remains that the churchyard was incorporated in the town defences either in the 13th century or the 14th century (another period for which we have documentary evidence of defensive work being undertaken), (Dunvan, 1795, 169, 178), or indeed at some other time, undocumented.

What is needed in Lewes now is some definite evidence of the extent of the Saxon and Medieval urban areas and their boundaries. This year's pilot excavations have suggested limits to the area where this search might be fruitfully continued.

Acknowledgements:

It is impossible to name all the individuals whose help I have relied upon in the course of these excavations, but I would particularly like to thank the Chairman of the Lewes Archaeological Group, Mr. Ted O'Shea; the Chairman at the time of the excavations; Mr. John Houghton; Lewes District Council and Mr. R. L. Stammers, Chief Technical Officer; Miss Fiona Marsden and her staff and helpers at Barbican House; Mr. K. Barton, M. Phil., who kindly looked at the pottery; Miss Caroline Cartwright, M.A., who analysed the charcoal samples; my Assistants on the excavations, Mr. John Hope, Mr. Dominic Perring and Dr. Owen Bedwin; my wife, Jane who organized the Finds Shed; and finally Mr. P. L. Drewett, B.Sc., Director of the Sussex Field Unit, without whose advice, aid and flint report the season's work could not have taken place.

XI. A field survey of the Parish of Elsted and adjacent areas, West Sussex.

by MARTIN BELL and TIM TATTON-BROWN

Part I – Prehistoric

by Martin Bell

During Easter 1974 a field survey was conducted in the Parish of Elsted and the surrounding area. The aims of this survey were two-fold, firstly to train Institute students in field survey techniques, secondly to study the pattern of settlement and artifact distribution within the area. Supervision was divided between Mr. Tim Tatton-Brown, who made a survey of Medieval and Romano-British settlement patterns (see below) and the writer, who surveyed the Prehistoric settlement pattern. An average of six students per day assisted. Each of us spent only two weeks in the field. Here we only intend to give a broad outline and pinpoint specific sites of interest. None of our conclusions, at this stage, should be regarded as final.

The Prehistoric survey concentrated on an area 4 miles x 2½ miles which included the scarp slope of the South Downs and the northern part of the dip slope. (Fig. 25) Cut into the dip slope was a series of dry valleys running south to the coastal plain.

Seven sites produced blade based industries of probable Mesolithic date. Of these, five are on the crest of the Downs above 600 feet. Site 47 is on a spur of the dip slope at 500 feet and site 62 at the foot of the scarp at 250 feet on the Upper Greensand. The chalk downs would appear to be much richer in Mesolithic occupation than the published evidence suggests (Drewett, 1974; Fig. 3). Sites 45, 47 and 63 were small concentrations indicative of short-term occupation. Sites 55, 80 and 57 were larger concentrations and may in fact represent a single site at over 700 feet O.D. Site 70 produced a tranchet pick and a number of flakes.

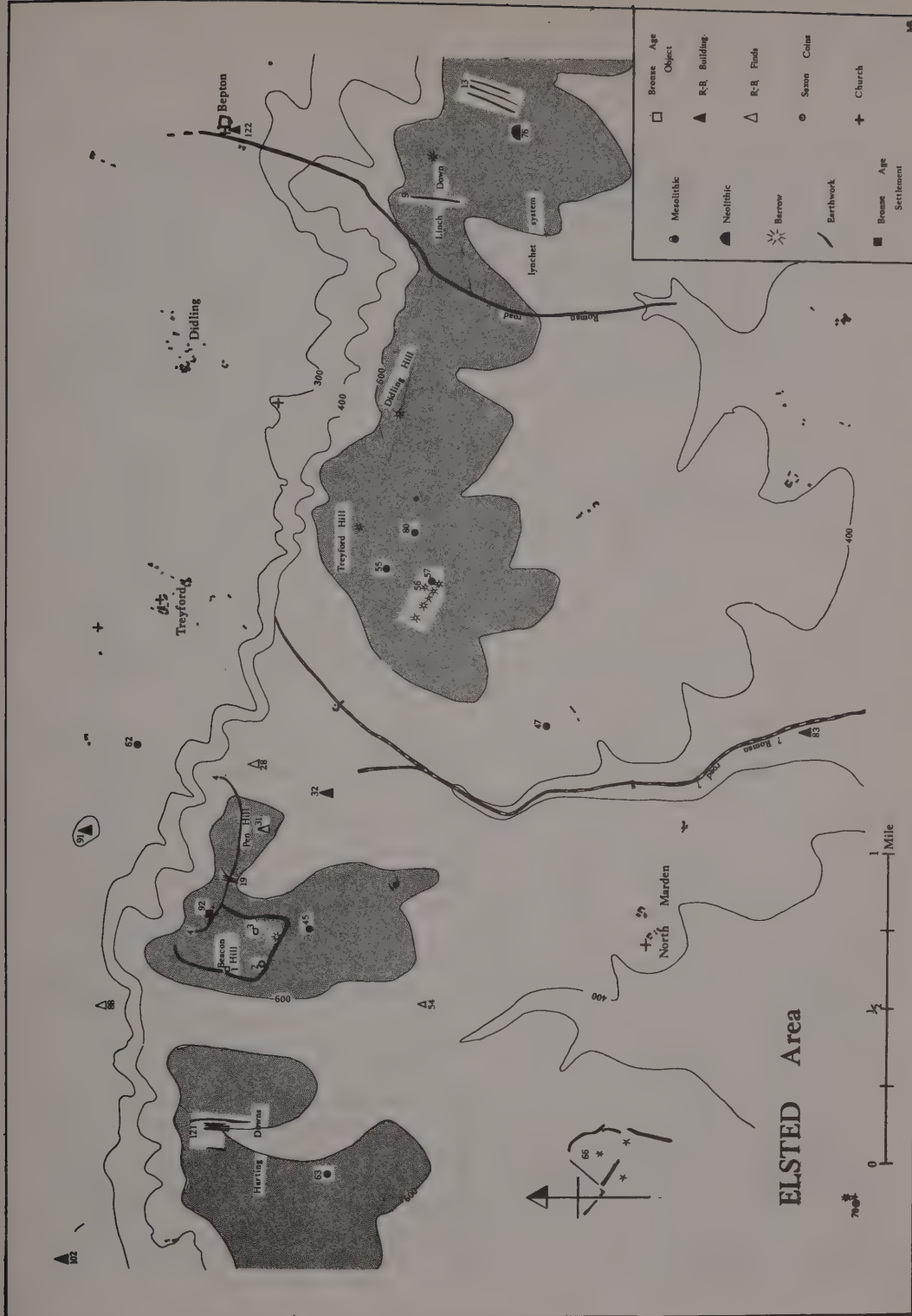


Fig. 25 A survey of the Elsted area.

No Neolithic occupation was known in the survey area. Several flint implements, notably a number of end scrapers and other retouched flakes, are of either Neolithic or Bronze Age date, but showed no clear nucleations, probably due to the disturbance by the plough. Site 76 lay in a recently planted forest and was located where a trackway had been bulldozed. Here was a large number of flint flakes, clearly nucleated in an area about 100 feet across. The most diagnostic features of the assemblage were four pressure-flaked leaves of Neolithic date. There were also fire-cracked flints, a number of retouched flakes, but no pottery. Neolithic settlement in Sussex is almost totally represented by causeway camps, long barrows and flint mines. This site, like that on Seaford Head, East Sussex (TV 510978), is an important, and apparently unenclosed, addition to the settlement pattern.

Sixteen barrows are probably of Early Bronze Age date. Nine of them are over 600 feet O.D. either on the crest of the escarpment or near the west where the spurs of upland run south. One spur south of Harting Downs includes two groups of three barrows, one Fernside Down and the other on Appledown. Five barrows form the line known as the Devil's Jumps on Treyford Hill. Just north of this line a small flinty mound (site 56) may represent the ploughed out remnants of a sixth barrow. Four groups of cross ridge dykes are known in the survey area. In each case they are at a point where a dip slope dry valley comes very close to the scarp slope and where it is possible to divide off blocks of downland by the expedient of a short length of ditch. Nos. 121 and 13 were surveyed and discussed by Curwen (1918). These features are probably Bronze Age and may have divided up areas of pasture.

The only possible settlement of this period is site 92, consisting of three semi-circular terraces on unploughed, sloping ground on the north-east side of Beacon Hill. These terraces resemble the platforms of Middle Bronze Age huts like those found by Cunliffe (1970) at nearby Chalton. A search of rabbit scoops produced 15 sherds of flint gritted pottery similar to that from local Bronze Age sites. Site 92 appears to lie outside the circuit of the Beacon Hill earthwork, but could be enclosed by earthwork 4 the other side of which is formed by the steep scarp face. Earthwork 4 appears to cut across the series of dykes 19, it also forms the north boundary of the Beacon Hill Earthwork which, on its other side, is of much larger proportions. It seems likely that a small Bronze Age boundary ditch (4) has here been utilized as part of the circuit of a hill fort constructed in the Late Bronze or Early Iron Ages. Two finds of Late Bronze Age metalwork are known from the interior of Beacon Hill earthwork. In 1909 (Garraway Rice 1911) four bronze palstaves were found in its south-east quadrant. During the excavation of the west entrance of the hill fort in 1947 (Keef, 1953) two gold pennanular ornaments were found. These finds suggest that the site was the focus of local settlement by the end of the Bronze Age. Indeed, Miss Keef suggested that her ornaments were foundation deposits for the earthwork. The south part of the interior was under the plough and pottery scatter showed the main occupation area to be in the south-east quadrant. Finds included 190 sherds of Late Bronze Age or Early Iron Age pottery, parts of two saddle querns and a number of flint flakes.

Later Iron Age occupation is represented by 'hut shelters' on a north-west spur of Harting Hill (just off Fig. 25) (Keef 1950) and by an eye bead from Harting Downs.

A number of finds of Romano-British material were made. These are discussed below by Mr. Tatton Brown in the context of their contemporary settlement pattern. Site 83 is a major villa which produced large quantities of roof, floor and box tiles. The plough had disturbed flint and greensand walls and a masonry block 1' x 1' x 1'6". Pottery included a sherd of samian and part of a 3rd century colour coated flanged bowl. Site 32 is on a spur of downland running south from Pen Hill. Here was a large number of pieces of box and roof tile, some greensand and sherds of Romano-British pottery, the only datable pieces of which were 2nd century. Two other scatters of Romano-British pottery (sites 31 and 28) were located higher up the same spur.

All four sites lie in a dry valley which breaches the escarpment. It runs south and becomes the Chilgrove Valley where Alec Down has excavated a number of villas (Cunliffe 1973). To one side of the valley is a well made trackway which we suggest could have been a Romano-British communication route linking these sites with Chilgrove and thence Chichester.

Part II – Roman, Saxon and Early Medieval

by Tim Tatton-Brown

The Roman, Saxon and early Medieval survey was concentrated on the extreme north-western parishes of Sussex north of the South Downs. It included the whole of the Dumpford Hundred and half of the Easebourne Hundred. This includes the modern parishes of Harting, Elsted with Treyford-cum-Didling (Plate XIX), Rogate with Terwick, Trotton with Chithurst, and Milland in the Dumpford Hundred, and Bepton (with Linch), Stedham with Iping, Woolbeding and Linch in the Easebourne Hundred. (Fig. 26 which shows the Medieval parishes before many of them were united.)

This area contains many different soils which reflect the great variety of lithological horizons in the Cretaceous beds of the area. In the northern part of the area an anticline exposes Wealden beds which consist mainly of clay. The thick woodland on this clay was not cleared until late Medieval times and enclosure only took place in the 1850s. Surrounding this are the much harder sandstones of the Hythe Beds which rise to 500 feet in places and have a scarp along the boundary with the Weald clays. On these beds is a poor, sandy soil and clearance of woodland must have occurred early in prehistoric times; exactly when is not yet known. The Hythe beds have a dip slope which runs south (as well as north) to the much more fertile Sandgate beds. The river Rother has found its course mainly through these beds and it is here at river crossings that the Saxon villages grew up with their fields on the Sandgate beds. To the south again is a long, thin east-west band of very sandy Folkestone beds. Ferruginous bands in these beds cause local elevation above the Sandgate beds and Gault on either side. Clearance took place very early here, perhaps even by Mesolithic times, and the heath country contains many barrows (e.g. the West Heath group) and Mesolithic sites. South again is the very thick Gault clay much of which is now being ploughed for the first time after extensive

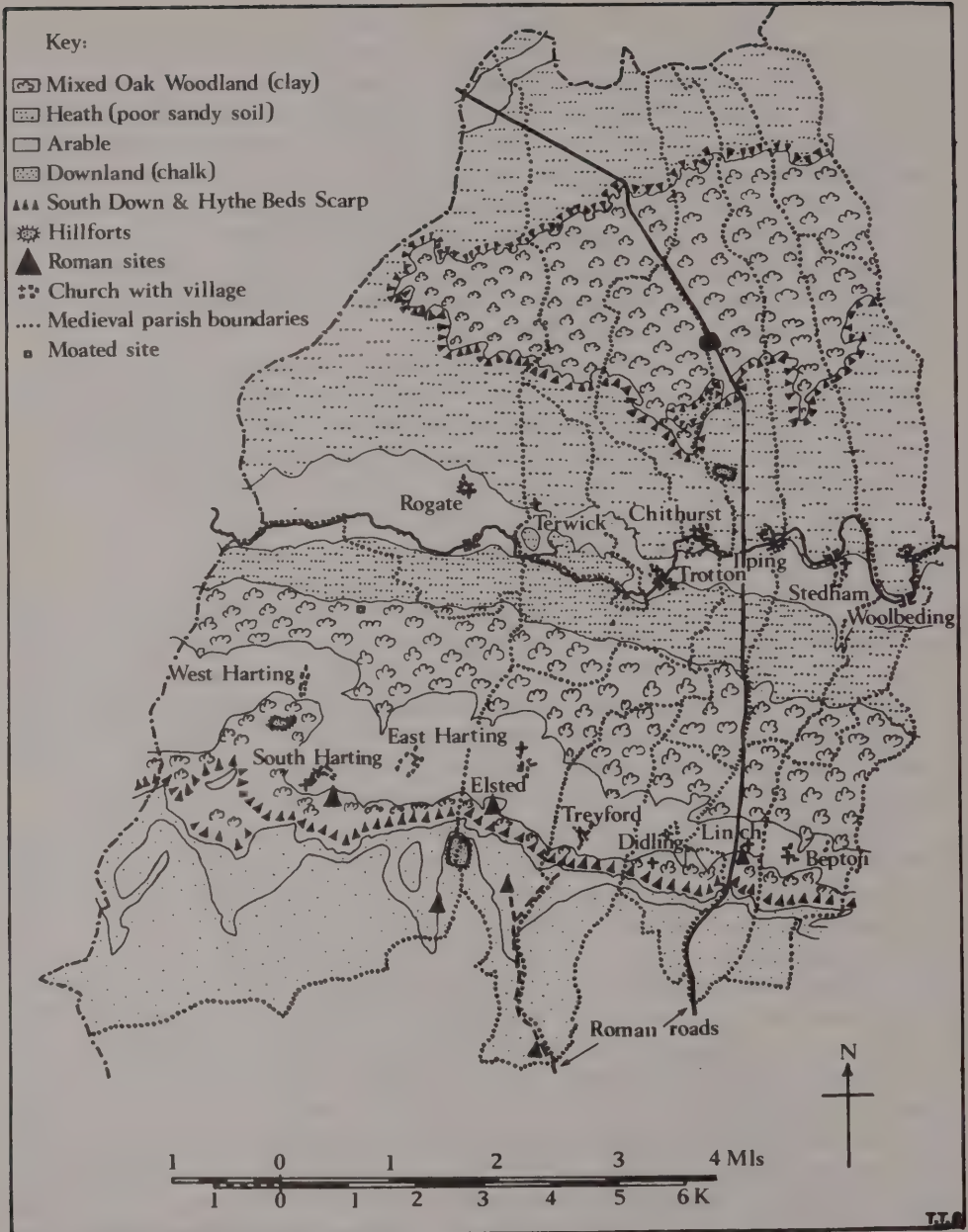


Fig. 26 A survey of North-west Sussex centred on the Parish of Elsted.

drainage. The woodland was not fully cleared till late Medieval times. South of the Gault is the Upper Greensand bench which has the best arable in the area. This bench narrows eastwards and from it comes the Malmstone, a soft building stone used in Roman times (e.g. at Chichester and Fishbourne) and extensively in Medieval times. Most of the Saxon villages lie on the Upper Greensand bench at 250-300 feet above sea level. South of this bench the scarp of the South Downs rise up to over 800 feet in places. At the bottom of the scarp is the Lower Chalk which is very marly in its basal beds and may have remained wooded and uncultivated till fairly recently. There is a spring line here and a lesser spring line occurs at the base of the Upper Greensand bench. Another spring line occurs at the base of the Hythe beds scarp to the north. Above the Lower Chalk, are the Middle and Upper Chalk which produce the classic "downland". Only the Upper Chalk contains the extensive bands of flint.

Except for the Bronze Age and Mesolithic sites on the Folkestone Beds, there are virtually no prehistoric sites known in this area which are not on the chalk downlands. The exceptions are the two Iron Age hill forts on Torberry which is on a promontory of the Lower Chalk and Hammer wood on the Hythe beds dip slope.

Running north-south through the area is an early Roman road which has a possible *Mansio* in the woodland area of the Weald clays. (Margary 1953). This road runs from Chichester to Silchester. Roman settlements in the area are otherwise entirely concentrated in the southern part. A number of sites were located on the chalk downlands which supplemented the many villas already found, largely by Mr. Alec Down (Cunliffe, 1973: 104). As well as this at least three Roman settlements have been found at the base of the Lower Chalk just above the Upper Greensand bench. One of these just south-east of South Harting produced Roman coins and some fine iron tools in 1938, while pottery and building material was also found in the same area during the present field survey. A second site was found half a mile south-west of Elsted on a small mound of Lower Chalk. Much Roman pottery and building material was found, including parts of box-flue tiles, and unfortunately the site appears to be nearly ploughed out. A third site was supposedly found near the now destroyed Linch church (Cunliffe, 1973) just east of the place where the Roman road reaches the bottom of the downs. The site is now occupied by Linch farm in the Parish of Bepton. It seems very likely that a series of small Roman villas should occur all the way along the Lower Chalk-Upper Greensand spring line, spaced roughly two miles apart. To the east of our area similar sites should therefore occur at Cocking and Graffham, while beyond this, sites are already known at Duncton and Bignor. Bignor, of course, is a large Roman villa, and its size is clearly due to the closeness of Stane Street and to the fact that the Upper Greensand bench is considerably wider here, providing much more good arable land. An east-west Roman road can also be postulated which would extend the "Greensand way" (Margary 1965; 165) westwards and ultimately lead to Winchester, thus also serving the line of villas on the chalk east of Winchester. (O.S. Map of Roman Britain, 1956).

No pagan Saxon burial sites are known in the area west of the Arun and it seems fairly likely that these Roman settlements, both on the Downs and on the Lower Chalk

were used well into the 5th century A.D. This hypothesis can however be tested with future work in the area. The break seems to occur in the 6th or 7th century A.D. when the "secondary" colonial Saxon settlements were inaugurated. These settlements are the villages which still largely survive today. (Dodgson, 1966, 1973). It is interesting to note that these settlements are at least twice as numerous as the Roman ones along the Upper Greensand bench, as well as being very close together along the Rother. The later Parishes become long, thin north-south strips. The boundary between the Dumpford and Easebourne hundreds (as well as perhaps the Ghidentroi and Sillentone (Singleton) hundreds of the Domesday survey) may perhaps have initially been the Roman roads.

Much work has been done on the documentary history of this area (Yates, 1972 and Troke) and we are lucky to have also the Parish histories of this part of Sussex already published in V.C.H. IV (Salzman, 1953). However, little archaeological work has been done for the Medieval period and the present survey has also looked at the Medieval settlement pattern, including the finding of Moated sites. One moated site was already known in the area at Parlour Copse in the northern part of Harting parish (unpublished, but see Yates, 1972) and a second was discovered just south-east of Trotton bridge. (Plate XX). This latter is presumably the homestead of the Camoys family, whose splendid monuments are in the church. A few other sites produced small scatters of Medieval pottery.

Acknowledgements:

We would like to acknowledge the friendly co-operation of local farmers during our survey; these included Mr. Shaxson of Elsted, Mr. Crees, The Edward James Foundation, West Dean Estate. We were both assisted by Miss A. Abbey.

XII. An archaeological survey of the line of the proposed A.27(M) north of Brighton

By VINCENT GREGORY

Mr. P. J. Fowler has frequently stressed the need for intense field survey in advance of motorway schemes (Fowler, 1972a; 91). Although valuable results have been obtained from such classic motorway rescue schemes as that undertaken for the M.5, Fowler stresses that such results could have been obtained more satisfactorily had it not been for the complete absence of any archaeological fore-thought in relation to the road construction, until it was almost too late. (Fowler, 1972b; 28). Fortunately, in the case of the proposed A.27(M) north of Brighton, archaeologists have been alerted well in advance of the proposed motorway development. In fact, it now seems unlikely that the road will be built much earlier than 1985. However, the proposals for this road have been submitted to the Department of the Environment and the initial planning stage is

complete. The Brighton Urban Structure plan outlines the proposed route in some detail, although the exact line to within a quarter of a mile is not yet known. The road will pass immediately to the north of Shoreham, Hove and Brighton and will cut through open farm land. Due to the undulating terrain, there are proposals for a large number of tunnels, embankments and cuttings.

The approach to the survey was basically that used by Fowler for the M.5 (Fowler, 1972b; 30). All existing records were studied particularly the Ordnance Survey record cards, local and national publications, Museum collections and maps. Secondly, vertical air photographs, particularly a new set taken for the West Sussex County Council, were studied in detail. The blocks of 'Celtic' fields recorded on Fig. 27 were largely obtained from this source. Thirdly, a start has been made on studying Tithe maps, from which possibly archaeologically significant field names can be extracted. Finally, every single field along the route of the A.27 is being systematically walked. Only the eastern end of the route had been walked at the time of going to press, and so Fig. 27 shows a significantly higher density of sites at the eastern end of the road.

As some doubt is now being cast on the academic value of information obtained from an arbitrary, narrow strip of county which completely ignores settlement patterns, a general study has also been made of all sites on the block of Downland north of Brighton

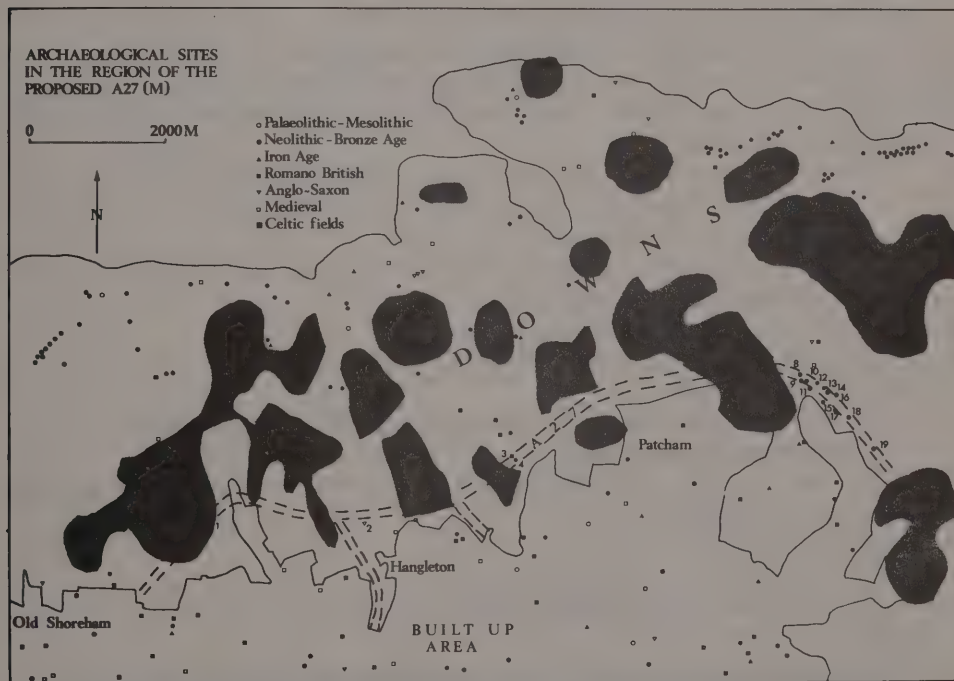


Fig. 27 Archaeological sites in the region of the proposed A.27(M) north of Brighton.

(Fig. 27). The purpose of this is to establish whether, taking into consideration that perhaps 80% of all archaeological sites in this area are in the process of being totally destroyed by ploughing, it might not, given a limited budget, be academically more valuable to take some unit other than an arbitrary linear one. In fact, on suspects that the central Government funds spent on rather hit-and-miss motorway archaeology may well have been better spent establishing settlement patterns in relation to economy and the environment in areas being destroyed by ploughing. The areas studied could then have been meaningful archaeological areas and not haphazard strips dictated by road planners. However, such strips, studied in detail, may well point the way to studying more meaningful units. Although this survey is by no means complete, a list of sites known at the time of going to press is appended to show the range of sites likely to be destroyed when this road is built. As these sites are simply those along an arbitrary line, no academic conclusions, like those in the Elsted parish survey (see above) can be made.

APPENDIX

List of known and recently discovered sites on the line of the A.27(M) (Fig. 27)

1. TQ 239074. Saxon? Skull of adult male. Found 1871.
2. TQ 261073. Saxon burial. Extended inhumation with rich grave goods.
3. TQ 282085. Romano-British pottery. Possible small Romano-British settlement.
4. TQ 285083. Complex of five possible house platforms, two possible cross ridge dykes and several trackways.
5. TQ 316097. Romano-British settlement. Much Romano-British pottery found.
6. TQ 316099. Small Iron Age/Romano-British settlement. Late Pre-Roman Iron Age and Romano-British pottery found.
7. TQ 318097-TQ 318095. Double lynchet trackway, field system and Beaker flint industry. Romano-British pottery found.
8. TQ 326095. Mound 40 metres long.
9. TQ 326095. Low bank and ditch. Possibly a cross ridge dyke
10. TQ 327095. Bank and ditch.
11. TQ 328094. Dew pond or quarry 3 metres deep and 20 metres in diameter.
12. TQ 330093. Possible round barrow.
13. TQ 328094. Large round barrow damaged in the 19th century when three extended inhumations were found.
14. TQ 330093. Lynchet.
15. TQ 327091. Late Bronze Age Pit and pottery.
16. TQ 332093. Low mound 40 metres long.
17. TQ 331092. Cross ridge dyke.
18. TQ 334089. Linear earthwork. Possibly a cross ridge dyke.
19. TQ 337085. Scatter of struck flakes and some tools. Possibly Neolithic.

XIII. A field survey of the site of the proposed Ardingly Reservoir, West Sussex.

By OWEN BEDWIN

Plans for the construction of a large reservoir near the village of Ardingly have been put forward by the Sussex River Authority. The building of the dam is expected to begin in mid-1975, and filling of the reservoir is scheduled for 1976-77. Accordingly, a survey of the archaeological potential of the area was carried out during 1974.

The land to be flooded is situated in the Weald, a few miles north of Haywards Heath. The Weald can be simply described as a broad dome, with its longest axis running east-south-east to west-north-west through almost all of East Sussex into West Sussex. Until Medieval times it was heavily forested, and thus, from the point of view of earlier periods, has been regarded as an area of comparatively little archaeological importance because of the difficulty of access. About 250 acres will be affected. Most of it is unspoilt woodland; the rest is pasture. The reservoir will be Y-shaped, damming one brook just downstream of the point at which another brook runs into it (Fig. 28).

Plan of the proposed
Ardingly reservoir

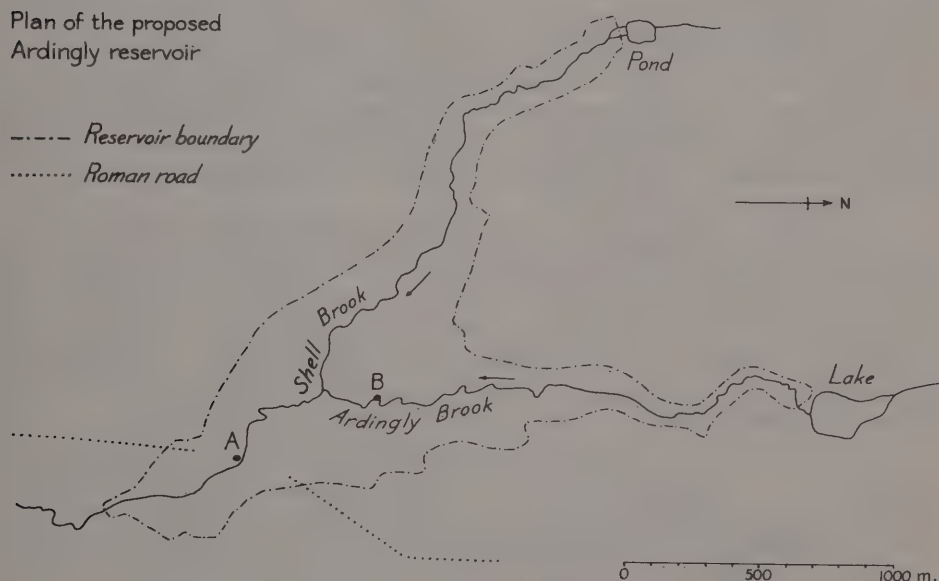


Fig. 28 Iron working sites in the area of the proposed Ardingly reservoir.

The site which turned out to be of the greatest interest is a multi-phase site on the south-west bank of Shell brook, at TQ 334289; marked A in Fig. 28. Although not a

great deal is visible now, there is sound documentary evidence for the existence of three industrial phases. This evidence is summarized as follows:

1309 A.D.: Activity at Fullingmill wood is recorded in an action for possession of "un molendin fulretta" by one Joan atte Ree in 1309 A.D. (This wood lies to the north-east bank of Shell brook, immediately opposite A in Fig. 28). "Molendin" is derived from the Latin root "molo", I grind; "fulretta" is presumably an early form of fuller's earth. This reference comes from a manuscript compiled between 1915 and 1925 by the late Mary S. Holgate, a local historian, of Ardingly. Unhappily, Miss Holgate nowhere states her original source, nor is the location of the site mentioned with any precision. In any event, the evidence was enough for her to suggest that a fulling mill was in operation at this time.

1568 A.D. — 1660 A.D.: Ten entries of "hammermen" and "workers at the hammer" (i.e. a forge) in the Ardingly parish registers. This information is given by Straker (1931) and he also puts the position of the forge 5/8 of a mile south-west of Ardingly church, bringing us neatly to TQ 334289.

1724 A.D.: On Budgen's 1724 map of Sussex, the site has become a fulling mill again.

When the fulling mill finally went out of commission is not known; sometime in the 19th century seems most likely.

It is highly probable that both the 16th and 17th century forge and the 18th century fulling mill tapped the water power provided by Shell brook. The "hammerponds" of the Weald are well-known; they are formed by the damming of a stream, and, through the intermediary of a water-wheel, supply the driving force for a forge hammer. Today, the remains of the dam, or bay, can be seen as a broad, low causeway running perpendicular to the stream, on its south-west bank.

Furthermore, I. D. Margary's work on the Roman roads in this area has shown that the London-Brighton way must cross Shell brook in this vicinity (Margary, 1965). Although he was unable to locate the actual crossing-place, he did trace the road to within about 100 metres of each bank, thus very effectively defining the area through which it could run (Fig. 28). A plausible possibility then, is that a Roman causeway across the bottom of the valley and across the stream formed the basis of a much later dam for the hammerpond.

Further north, in Ardingly brook, is what appears to be the site of a bloomery (B in Fig. 28). Several large lumps of coarse bloomery product were found in the stream here, and they were far too heavy to have been washed downstream. It therefore seems likely that the stream at this point has changed its course, and in so doing, has cut through a bloomery. No definite date for this site can be put forward, but it is most likely to be Medieval, a period when the Wealden iron industry was at its peak.

Many Mesolithic sites are known in the Weald, but only one lies within the area to be flooded. This is a small sandstone rock-shelter which, according to local information, was dug out about 40 years ago.

Since the survey was carried out, negotiations have taken place between

representatives of the Unit, the Department of the Environment, and the Mid-Sussex Water Authority, and permission has been obtained to excavate the fulling mill/forge site, probably in June and July, 1975. Apart from its intrinsic interest, this site is also the most vulnerable, being situated in the area which will be destroyed first by the building of the dam. Excavation will also provide an opportunity to compare the historical records of industrial activity with the archaeological evidence, and also to determine where the London-Brighton Roman Road crossed Shell brook.

REFERENCES

- Ashbee, P. 1970 *The Earthen Long Barrow in Britain*. London, J. M. Dent and Sons.
- Bell, M. G. 1972 *Bishopstone Excavations 1968-71: An Interim Report*. Falmer, University of Sussex Archaeological Society.
- Brodribb, G. 1969 Stamped Tiles of the Classis Britannica. *Sussex Archaeological Collections* Vol. CVII; 102.
- Cleere, H. F. 1963 A Note on Roman Bloomery Tuyères. *Sussex Archaeological Collections* Vol. CI; 48.
- Cleere, H. F. 1970 The Roman-British Industrial Site at Bardown, Wadhurst. *Sussex Archaeological Society Occasional Paper* No. 1.
- Cleere, H. F. 1972 The Classification of Early Iron Furnaces. *The Antiquaries Journal* Vol. LII, Part 1.
- Collins, A. H. 1955 Saxon Cinerary urn from Pagham Churchyard, *Sussex Notes and Queries* Vol. XIV, 123.
- Colt Hoare, R. 1810 *The History of Ancient Wiltshire*. London.
- Cooper, W. D. 1850 *The History of Winchelsea*. Privately published.
- Corder, P. 1959 The Structure of Romano-British Pottery Kilns. *The Archaeological Journal* Vol. CXIV.
- Cunliffe, B. W. 1970 A Bronze Age Settlement at Chalton, Hants. (Site 78). *Antiquaries Journal* Vol. L, Part 1.
- Cunliffe, B. W. 1973 *The Regni*. London, G. Duckworth.
- Cunliffe, B. W. 1974 *Iron Age Communities in Britain*. London, Routledge and Kegan Paul.
- Curwen, E. and Curwen, E. C. 1918 Covered ways on the Sussex Downs. *Sussex Archaeological Collections*. LIX; 35
- Dimbleby, G. W. 1975 Pollen Analysis in Drewett, P. L., The excavation of a Turf Barrow at Minsted, West Sussex, 1973, *Sussex Archaeological Collections*. (Forthcoming)
- Dodgson, J. McN. 1966 The significance of the distribution of the English place names -ingas, -inga in South East England. *Medieval Archaeology* Vol. 10.
- Dodgson, J. McN. 1973 Place names from *ham* distinguished from *hamm* names in relation to the settlement of Kent, Surrey and Sussex. *Anglo Saxon England* Vol. 2.
- Down, A. and Rule, M. 1971 *Chichester Excavations* Vol. 1. Phillimore.
- Drewett, P. L. 1974 *Rescue Archaeology in Sussex*. Institute of Archaeology.
- Dunvan, P. 1795 *The Ancient and Modern History of Lewes*. Privately published.
- Evison, V. I. 1968 Quoit Brooch Style Buckles. *The Antiquaries Journal* Vol. XLVIII; 231.
- Fleming, L. 1958 Becket's Barn, Pagham. *Sussex Archaeological Collections* Vol. 96; 135.
- Fleming, L. Undated *A History of Pagham*. Privately published.
- Fowler, P. J. 1972a The present significance of fieldwork in P. J. Fowler (Ed.) *Archaeology and the Landscape*, London, John Baker.
- Fowler, P. J. 1972b Archaeology on the M.5 Motorway, 1969-71: Some provisional results, analyses and implications in E. Fowler (Ed.) *Field Survey in British Archaeology*, London, Council for British Archaeology.
- Garraway Rice, R. 1911 Report as local Secretary for Sussex. *Proceedings of the Society of Antiquaries of London*. Second series, Vol. XXIII; 376.

- Gebbels, A. 1974 *Analysis of Animal Bones from Bishopstone and Newhaven in relation to the economy of the Iron Age and Roman period in Sussex*. (Unpublished B.Sc. dissertation of the University of London).
- Gibson-Hill, J. 1974 Notes on Lifting a Furnace Base from the Romano-British Sites at Broadfields, Crawley. *The Journal of the Historical Metallurgy Society* Vol. 8, No. 1; 50.
- Grinsell, L. 1934 Sussex Barrows. *Sussex Archaeological Collections* Vol. LXXV; 219-220.
- Hill, D. 1969 The Burghal Hideage: The Establishment of a Text. *Medieval Archaeology* Vol. XIII; 84.
- Homan, W. McL. 1940 *Winchelsea: the founding of a thirteenth century town*. (Unpublished)
- Homan, W. McL. 1949 The founding of New Winchelsea. *Sussex Archaeological Collections* Vol. 88; 22.
- Horsfield, T. W. 1924 *History of Lewes* Vol. I. Privately published.
- Keef, P. A. M. 1950 Harting Hill, Hut Shelters. *Sussex Archaeological Collections* Vol. LXXXIX; 179.
- Keef, P. A. M. 1953 Two gold penannular ornaments from Harting Beacon, Sussex. *The Antiquaries Journal* Vol. XXXIII; 204.
- Lower, M. A. 1852 *Handbook of Lewes* (2nd Edn.); 75.
- Margary, I. D. 1953 Recent discoveries by the Ordnance Survey of Roman roads in Sussex. *Sussex Archaeological Collections* XCI, 3 ff.
- Margary, I. 1965. *Roman Ways in the Weald*, Phoenix, London.
- Money, J. H. 1974 Iron Age and Romano-British Iron Working Site in Minepit Wood, Rotherfield. *The Journal of the Historical Metallurgy Society*, Vol. 8, No. 1.
- Norris, N. E. S. and Thomson, D. M. *Sussex Notes and Queries* Vol. XVI; 35.
- Ralegh Radford, C. A. 1970 The Later Pre-Conquest Boroughs and their Defences. *Medieval Archaeology* Vol. XIV; 84.
- V.C.H. IV 1953 *Victoria County History of Sussex* Vol. IV. L. F. Salzman (Ed.)
- Straker, E. 1931 *Wealden Iron*; 408, Bell and Son.
- Tebbutt, C. F. and Cleere, H. F. A Romano-British Bloomery at Pippingford, Hartfield. *Sussex Archaeological Collections* Vol. CXI.
- Thomson, D. 1967 Green Wall, Lewes, *Sussex Notes and Queries* Vol. XVI; 337.
- Thurnam, J. 1870 On Ancient British Barrows, Part II, Round Barrows. *Archaeologia* Vol. XLIII; 296.
- Troke, R. C. *History of the Parishes of Elsted, Treyford and Didling*. Privately Published.
- Tylecote, R. F. and Owles, E. 1960 A Second Century Iron Smelting Site at Ashwicken, Norfolk. *Norfolk Archaeology* Vol. 32 (3); 142.
- Tylecote, R. F. 1969 Recent Work on Early Iron Working Sites in the Stamford Area. *Bulletin of the Historical Metallurgy Group* Vol. 3, No: 2.
- Welch, M. G. 1971 Late Romans and Saxons in Sussex. *Britannia* Vol. II; 232.
- White, G. M. 1934 A Settlement of the South Saxons. *The Antiquaries Journal* Vol. XIV; 392-400.
- Wilson, D. M. 1968 Medieval Britain in 1967. *Medieval Archaeology* Vol. XII; 161.
- Wilson, D. M. 1968 Medieval Britain in 1968. *Medieval Archaeology* Vol. XIII; 240.
- Yates, E. M. 1972 *A History of the Landscapes of the Parishes of South Harting and Rogate*, Phillimore.



Plate I Alfriston Long Barrow. General view from the north. Scale, 2 metres. (Photo: P. L. Drewett)



Plate II Alfriston Long Barrow. The central crouched burial. Scale in centimetres and decimetres. (Photo: P. L. Drewett)

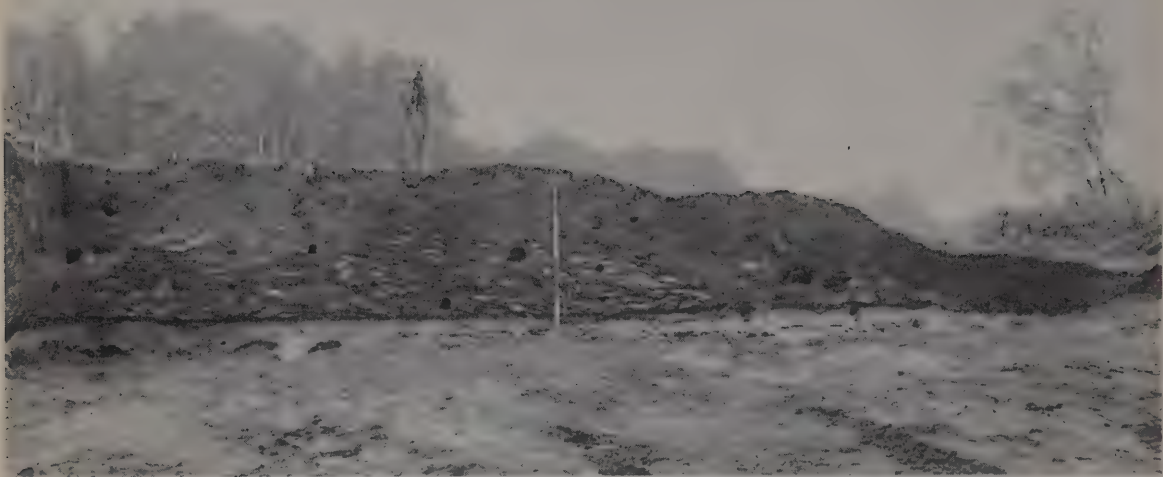


Plate III West Heath Barrow I. West face of north-east quadrant showing turf stack. Scale 2 metres. (*Photo*: R. Williams)

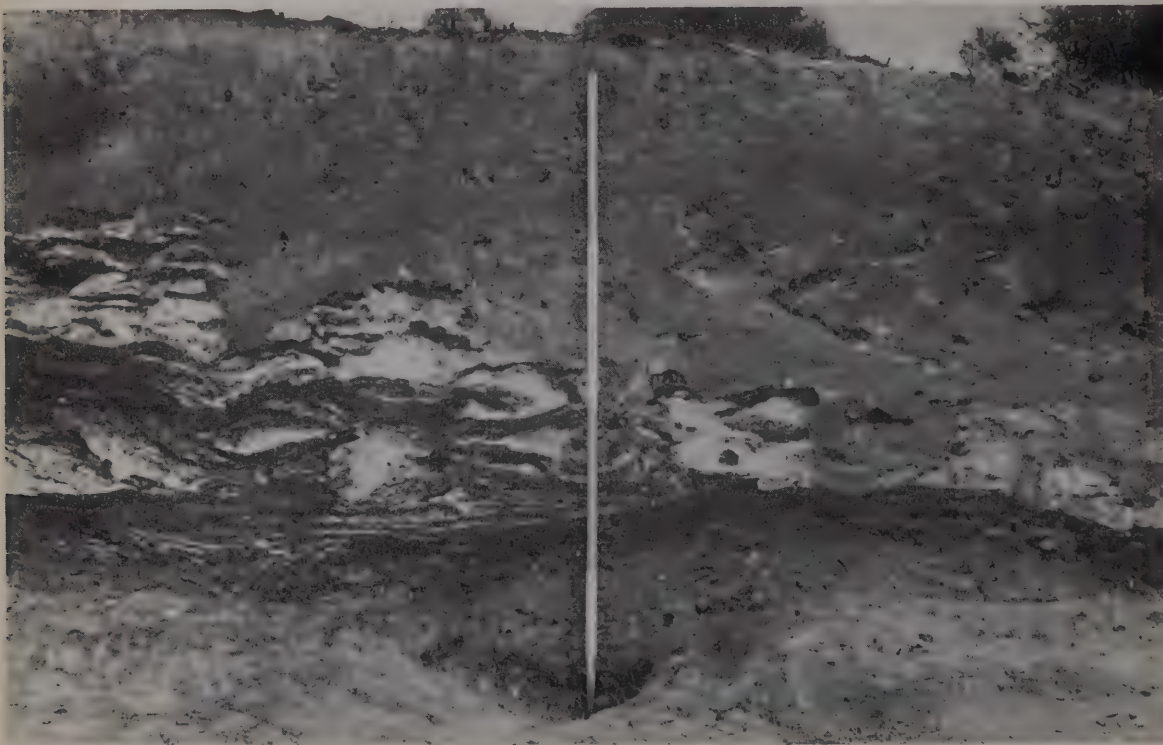


Plate IV West Heath Barrow I. East face of south-west quadrant showing Mesolithic pit buried beneath turf mound. Scale 2 metres. (*Photo*: R. Williams)



Plate V West Heath Barrow III. General view from the south. Scale 2 metres. (*Photo*: G. Denford)



Plate VI West Heath Barrow III. View of north-east quadrant showing central turf mound. Scale 2 metres. (*Photo*: G. Denford)



Plate VII West Heath) Barrow III. Section H-G of Ditch I showing V-shaped ditch and charcoal layer used for C-14 date. Scale 2 metres. (Photo: G. Denford)

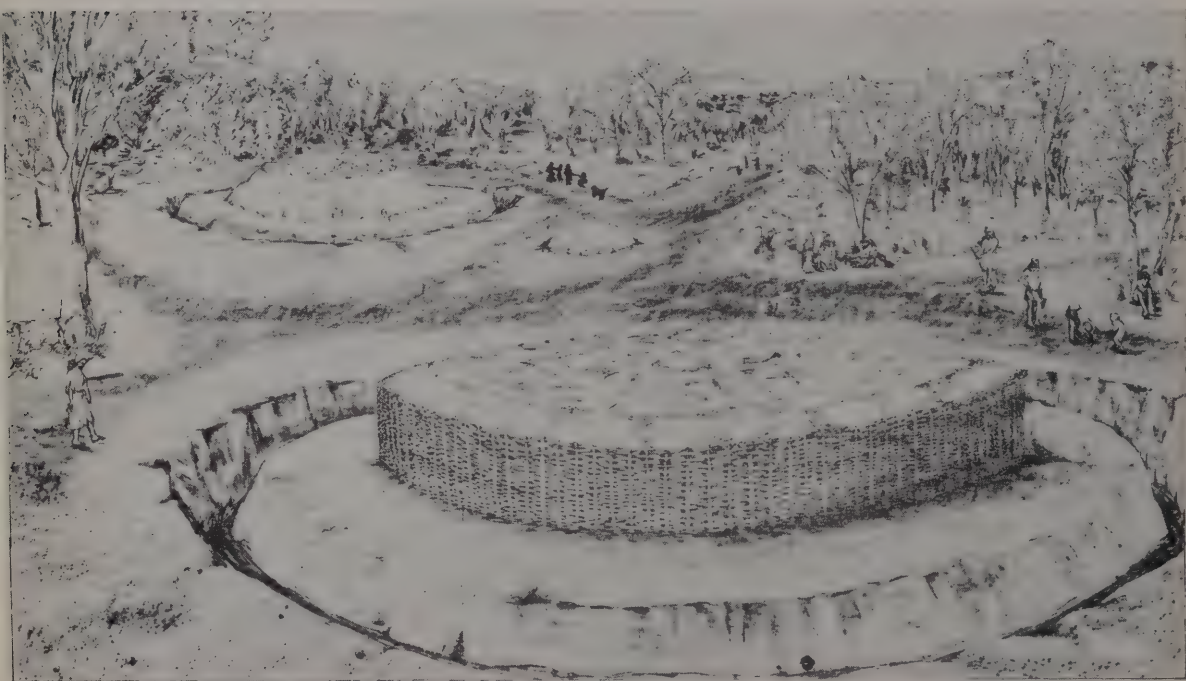


Plate VIII West Heath. Reconstruction of Barrow III phase I, c. 1600 B.C., with Barrows I and II in distance. Drawn by Lysbeth Drewett



Plate IX Minsted. General view of barrow excavation from the south-west. Scale 2 metres. (Photo: P. L. Drewett)



Plate X Bishopstone. Air view of the excavations from the north-east. (Photo: S. Adams)



Plate XI Bishopstone. Pre-Roman Iron Age burial in a rubbish pit. (Photo: B. Westley)



Plate XII Bishopstone. Anglo-Saxon Structure I from the east. Scale 2 metres. (Photo: B. Westley)



Plate XIII Newhaven. Structure 5 from the south with part of the north-west wall removed by excavation in 1973. Scale 2 metres. (Photo: B. Westley)



Plate XIV Crawley. Furnace No. 7 during excavation, showing overhang of slagged lining. Scales in centimetres. (Photo: P. Wyles)



Plate XV Beckets Barn, Pagham. Late 7th–Early 8th century A.D. cobbled trackway. Scale 2 metres. (*Photo: V. Gregory*)



Plate XVI Angmering. The altar tomb; the plaster lining has been chipped away to allow the arms to lie naturally. The remains of the chalice have been removed. Scales in centimetres and decimetres. (*Photo: S. White*)



Plate XVII Angmering. The east end of the church, showing the apsidal Saxon chancel within the rectangular Norman chancel. The Saxon masonry has been cut through in two places by later graves. Part of the altar tomb is visible at the bottom right. Scale 2 metres. (*Photo: S. White*)



Plate XVIII Lewes. Brook Street South. 19th century tanning pits. Scale 2 metres. (*Photo: G. Denford*)



Plate XIX Elsted area survey. View north from the Downs over Didling village with the church in the foreground. The Hythe beds dip slope is in the background. (Photo: G. Denford)



Plate XX Elsted area survey. View west of moated site just south-east of Trotton Bridge (which is visible in the background). (Photo: G. Denford)

A Re-consideration of the South-East European Sources of Archaeological Obsidian

by JOHN NANDRIS

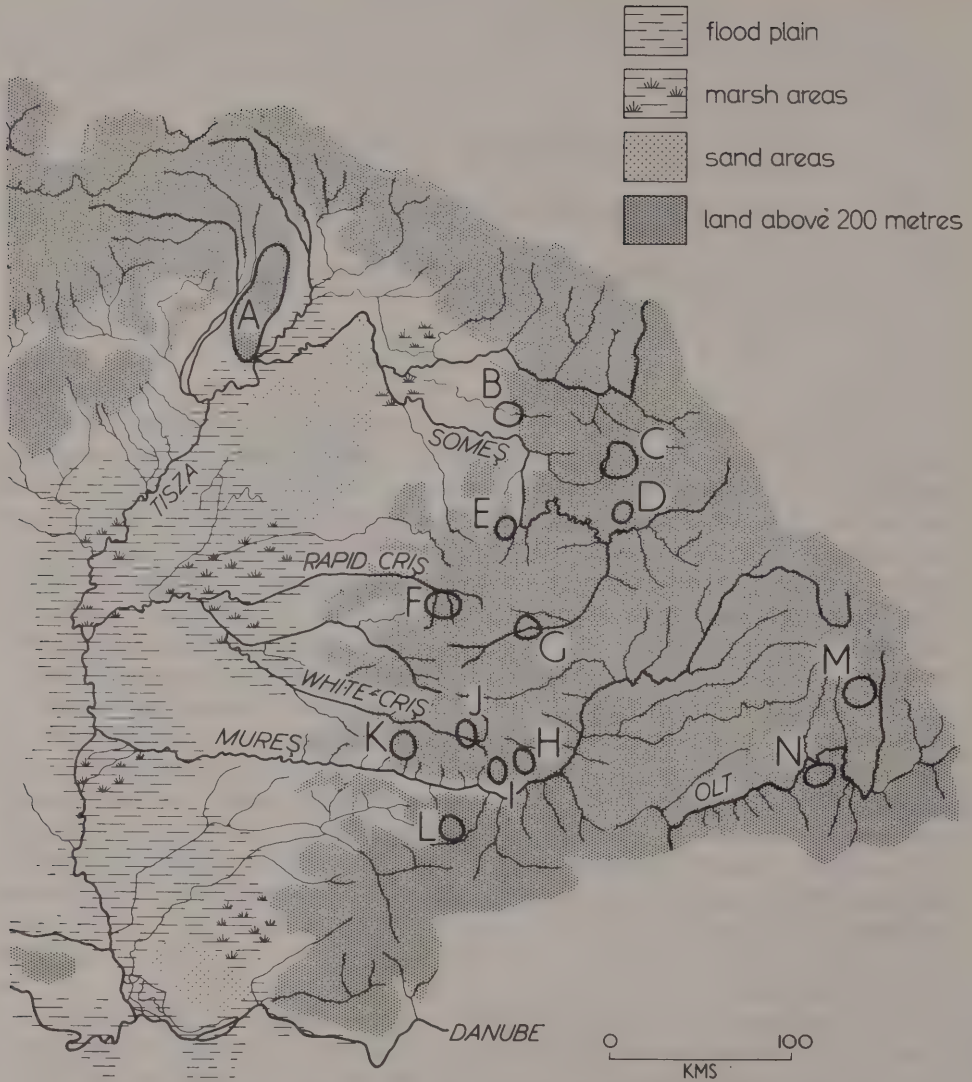
This article describes the results of fieldwork on the sources of obsidian in south-east Europe, carried out as part of a programme including other archaeological and environmental research during a short period in the summer of 1974. The object of the part of the work devoted to obsidian was to characterize the geological sources of archaeological obsidian in south-east Europe, by obtaining samples from them for neutron activation analysis, as a preliminary to the analysis of archaeological specimens. This was the first occasion on which fieldwork in this area has been carried out with the aim of verifying the geological sources of obsidian, and it yielded unexpected negative evidence about them. The general location of all the regions visited is shown on Map 1.

The work was organized on the basis of a collaboration between the Institute of Archaeology of London University and the Muzeul de Istorie al Transilvaniei of Cluj, Director Mr. H. Daicoviciu, and chief collaborator in the field Gh. Lazarovici; and in Hungary with Dr. Nándor Kalicz of the Archaeological Institute of the Hungarian Academy of Sciences. It was supported by the British Academy, the Institute of Archaeology (London), and the British Council. The neutron activation analysis of obsidian is being carried out at the Postgraduate School of Studies in Physics of the University of Bradford.

History of Research

It is appropriate to start with a brief examination of the literature and the history of research into the obsidian problem in south-east Europe, because interest in obsidian is documented in the scientific literature well back into the nineteenth century, and this has given rise to a number of verities which have persisted into the present decade.

Some possibilities of linguistic as well as geological confusion might be noted here. In early geological literature, up to the end of the nineteenth century andesite was sometimes referred to as "Trachyte". Obsidian is usually correctly identified in Hungarian by the same name as in English, but can be referred to as *Tűzkő*, which is also the word used for flint. The term means "fire stone" and refers to the use of flint for striking a light with a steel. On the flat, alluvial lands of the Alföld, flints are a rarity — except on



- A. Tokaj-Hegyálja (Zempleni Hegyseg)
- B. Oas-Negresti
- C. Tibles Group
- D. Lelești-Ciceu
- E. Porolissum
- F. Valea Sacuieului
- G. Gluj-Gilau

- H. Techerau (Muntii Metalici)
- I. Sacarimb (Muntii Metalici)
- J. Valea Bradului (Muntii Metalici)
- K. Rosia Noua (Zarand Mountains)
- L. Glod, Cerbel
- M. Harghita Group
- N. Persani

This map represents the regions of south-east Europe within which one or more sources of archaeological obsidian have been claimed in a geological context. All these regions were visited and evaluated during the course of fieldwork in 1974, as a result of which only region A can be confirmed as a source of obsidian.

archaeological sites; so that it often happens that the inclusion in place names of the term gives a clue to the presence of strike-a-light flints, and hence of archaeological sites. The site of Szegvár-Tüzköves is a case in point. Toponymics can also be used in the location of geological features but here too they can not always be taken literally. The name Dealul cu Cremenei ("the hill with flints") denotes quite accurately a localized scatter, not of flints *sensu stricto*, but of pyroclastic rocks associated with the nearby volcanic neck at Porolissium, and this was one of the sites examined during 1974 for obsidian.

We should now consider a selection of the literature, adequate enough to give a picture of the history of the research, summarizing some of the works which may be difficult to obtain widely. Geological studies of the intra-Carpathian area such as those by Beudant (1818) or Richthofen (1860), and specifically of the Tokaj-Hegyalja region (e.g. Szabó 1865-66), noted obsidian, and some analyses were carried out both of obsidian and of associated rocks. Archaeological material was also being collected from sites. In 1869 Rómer published a number of large obsidian cores, including ones from Erdőbénye, which he illustrated with woodcuts and some of which are still in the Cluj Museum (Rómer 1869).

In 1887 there appeared a work devoted specifically to obsidian, which still retains a good deal of its importance, namely the paper delivered by G. Szádeczky on the 15th February, 1886 to the Hungarian Academy of Sciences and published as Szádeczky 1887. The title translates as "Obsidian from Hungary, especially from a geological point of view". The value of this work lies not so much in the analyses cited, as in the clues it gives us to the localization of geological sources. He remarks even at that time that these are relatively impoverished on account of their long exploitation by prehistoric man, and that no geological sources in Hungary are known to yield significant quantities of obsidian — other than those he discusses in some detail which mainly lie in the Határ Mountains of the Zemplén region near Tokaj. Hungary in this sense implies the intra-Carpathian region; Szádeczky refers to Toth's work on the "Minerals of Hungary" (Szádeczky 1887; 15) and we should note that at this date the sources of Ciceu; Glod and Cerbel; Cluj in the banks of the Szamos; and Valea Brad, are already mentioned. Szádeczky regards these as secondary sources and as so insignificant as to be negligible, and it is not clear whether he himself had examined them. The claim that these are sources of obsidian therefore goes back at least as far as Toth.

The collection of archaeological obsidian continued into the twentieth century. Marțian (1909 — Roumanian version Marțian 1920) published his survey of Transylvania, listing obsidian finds and they are also noted by Andrieșescu (1912). Endre Orosz (1911) lists finds of cores in Transylvania, giving dimensions of up to c. 11 cms. He lists the following archaeological sites:

Alsó — Föld
 Hideg — Szamos
 Kis — Iklód (Iclod)
 Magyar — Bikal
 Maros — Vásárhely

Mező – Böö
 Nagy – Almás
 Olah – Fodorháza
 Szacsva (Saciova, S.E. of Sf. Gheorghe)
 Szamosújvár (Gherla)
 Szék 10.5 cm. core
 Szucsag (Suceag) 7 cm. core.
 Apahida 9.5 cms.
 Sajósárvár (noted as Sárviz, but = Sirioara) 7 cm.
 Salamon 11 cms.

The collection of archaeological specimens led archaeologists to speculate on the sources of obsidian, and to the following published exchanges. In 1924 Nicolăescu-Plopşor wrote a short note in *Arhivele Olteniei* (vol. III, pp. 137-8) whose only merit was to challenge geologists to produce sources for raw materials, eliciting responses in the same journal from Roska (1925) and Popescu-Voiteşti (1925). Roska notes the following information about geological sources:—

- i) That greenish obsidian is found at Mád and Olaszliszka (in the Zemplén Mountains).
- ii) as sources in the Zemplén Mountains:
 - A. Tokaj-Eperjes at Erdőbénye
 - B. Mondoha
 - C. Zsákos
 - D. Tolcsva
 - E. Bellő
 - F. Szöllöske(rt)

— all in the Zemplén and Sáros administrative regions.
- iii) That ii) D and F “have nearly white obsidian because of numerous air bubbles”.
- iv) That sources in Transylvania are:
 - a) Leleşti (judeţ Solnoc-Dobâca) in trachyte tuff.
 - b) Glod and Cserbel (jud. Hunedoara), citing for this Szádeczky 1887.
- v) He mentions finding an intact nodule of obsidian at Valea lui Mihai (jud. Bihor). We would probably nowadays be inclined to link this with the known archaeological finds from this north-west Roumanian region, which include a great deal of apparently mesolithic and early neolithic obsidian, such as Galoşpetru at Valea lui Mihai, and Ciumeşti 22 kms. to the north-east. The fact that this was an intact nodule is however, worth remarking on, since the Tokaj-Zemplén sources are only about 100 kms. away to the north-west across the Nyírseg sands and the Tisza and Bodrog rivers.

A second response came in a letter from the mineralogist Popescu-Voiteşti to Nicolăescu-Plopşor, a paragraph from which was published (Popescu-Voiteştiu 1925). Apart from noting flints of various types, following on Roska 1925, the obsidian sources he notes are:

- 1) In Roumania — 1. Southern Harghita
 2. Perşani
 3. Săcărîmb "with true obsidian".
 4. Tecerău (= Techerău)
 5. Almaş
 6. Hidegkut — Dealul Grifului
 7. Ciceu (near Reteag — not, as in Păunescu 1970; 86, near the Retezat)
 8. Valea Bradului, near Brad.
 9. Glod, and
 10. Cserbel — in the Hunedoara, "in basalts".
- 2) In Hungary — A. Telkibánja
 - B. Tolcsva, near Tokaj and Szantó
 - C. Moczar, near Schemnitz.

The observation against Săcărîmb might suggest an awareness that other materials were already being included in the discussion. Unfortunately Almaş and Hidegkut are both rather widespread toponyms. The remainder are clearly locateable.

In 1929 Gordon Childe confined himself to observing that "obsidian is found only in the Hegyalja range of northern Hungary and in the Harghita Mountains of eastern Transylvania" (Childe 1929; 7). Roska in 1933, considering the implications about "trade" and movements of peoples, which it was hoped to find in obsidian distribution, repeats as geological sources:

- a) The bank of the Kisszamos (Someşul Mic) near Cluj mixed with gravel.
- b) Valea Brad in quantities too small to be worked
- c) Glod and Cserbel "mixed with basalt". (The claim that obsidian is associated with basalt, a relatively slow flowing basic extrusive rock, is still found in Roumanian geology, whereas one would more often expect an association with freer flowing acid eruptive rocks such as andesites, and especially in the case of south-East Europe with explosion debris, when the obsidian is found as bombs.)

At the same period geological work was published, describing the occurrence of hydrothermal products (opalates in particular) in eastern Transylvania, by the eminent local geologist János Bányai, who died in 1968 and whose collection is now housed in Odorhei Museum. According to Bányai (1932) opals occur in the Covasna judeţ (Harghita region) at:

- i) Doboşeni (la Bartaberc)
- ii) Brăduţ (Pîrîul Egrés)
- iii) Filia (Pîrîul Koşag. Near Brăduţ. This is equivalent to our Nagy Kosag)
- iv) Herculan (Also near Brăduţ; at Váshanyás, Vajúvár, Bodvaj).

Opal is not related geologically to obsidian, and obsidian is not a hydrothermal product, yet this geological work relates to claims for obsidian in the region, as well be seen.

The archaeological occurrence of obsidian over a wider area was now receiving attention. Štefan Janšák (1935) studied the obsidian found in Slovakia and opined that the whole intra-Carpathian region would have been supplied with obsidian from the Tokaj mountains and their extension into Slovakia towards Prešov. Kostrzewski in 1939 described the occurrence of obsidian implements in Poland, which he mapped, and referring back to Krukowski's claim for mesolithic occurrence, based however only on the typology of four surface finds. Kostrzewski refers to Telkibanya as a source.

A paper by Stanciu (1937) is worth noting as an attempt to put the Harghita and other Roumanian volcanoes into a wider geological context, which would also include the Tokaj-Hegyalja volcanoes. He links the eruptive line of Harghita with one running from Iceland through southern Jutland along the Elbe and Oder through northern Czechoslovakia and the Hegyalja into the Oaş region, Rodna mountains, Caliman, Baia Sprie, through Harghita and straight to the south-east via Mangalia, Eregli and Ankara, across the head of the Gulf of Mersin into Mesopotamia and the Arabian eruptive mass. While the archaeologist is not qualified to comment on this geological notion, it would, if valid, form a geological link between the obsidian sources of the Tokaj-Hegyalja-Prešov region, and some of the Anatolian sources.

In 1942 Marton Roska published his gazeteer of archaeological finds in Transylvania, including in it a map with nearly a hundred finds of obsidian (Roska 1942, 323; Map VI), a form of which had already appeared in Roska 1933. The map is more readily available in Păunescu 1970, fig. 52, where it is amplified and brought up to date, and where we can see that obsidian occurs in Roumania from the Aurignacian and Gravettian onwards. It may also be supplemented with the map found in Comşa 1969.

A little later on Gábori and Vértes were also concerned with the problem of obsidian both in Hungary and in a wider context. Gábori (1950) pointed out that the material occurs in the Aurignacian in Hungary (as indeed it does in south Russia) and in the Magdalenian, but not in the Solutrean; it is then found especially in the Bükk culture, and its use intensifies very markedly in the Bodrogkeresztúr culture in the Copper Age. This last fact is of interest in relation to some ideas about the sources of the wealth of the Bodrogkeresztúr culture which have been alluded to elsewhere (Nandris 1972:76); obsidian must be considered as another element in that economic picture. The correlation of archaeological obsidian with salt deposits, claimed by Roska and alluded to again by Gábori (1950), ought also to be re-examined in the light of present knowledge. The whole question of the relative wealth of the Bodrogkesztúr in materials such as copper and gold, which do not occur naturally in its homeland, and what this wealth was based on is an important problem, into which not only tangible traits such as obsidian may enter but also less tangible ones such as for example salt and hides.

Gábori (1950) also remarks that it is not possible to distinguish visually between Tokaj and Melian obsidian. In 1953 Vertés (*AE* 1953/2, 103-4) noted that in the mesolithic "Tokaj obsidian" is found 600 kms. away on the Vistula, and in the Magdalenian in Czechoslovakia at the Žitny cave. There is none in the "Magdalenian" of Öthalom near Szeged, but at Pilismarot it comprises 10% of the stonework. Other sites in

Hungary such as Sagvár (radiocarbon dated to the 17th and 16th M.b.c.*) also have obsidian, and in the Subalyuk cave, which is only c. 50 kms. from Tokaj, it is found in the Mousterian.

In 1957 Bányai produced another work in which he considered the "Useful Mineral Resources of the Magyar Autonomous Region" of eastern Transylvania. In this he mentions a fine, black "*basaltoid andesite*" from central Harghita, which (although it has fine crystals) can be struck and forms sharp blades and flakes. This is clearly not obsidian, but it can be flaked and also polished. Specimens of this rock can be seen in the mineralogical collection of Miercurea-Ciuc Museum. In view of his very extensive acquaintance with the geology of the region it is well worth noting his statement that the obsidian from the archaeological settlements is not from the region, and that it does not exist geologically in the Covasna judeţ (Bányai 1957; 21). Another relevant feature in this work is the description and plan of Opálbarlang (Barlang = cave) on mount Harghita (Bányai 1957; 159). This site was examined in 1974. It is virtually synonymous with Băile Chirui (= Kirujfördő) and its importance will be discussed further.

In the same year Srejović and Jovanović published their study of the stonework from the mound of Vinča excavated by Vassic. A total of 3,689 pieces of stonework from all levels included 1,398 pieces of obsidian, comprising a good blade industry and including the same types as in the flintwork. A maximum importance of obsidian is indicated for the levels from 8.6-8 metres, while that of flint was at 7-6 metres. Obsidian was absent above 4 metres, where there is a marked decline in all stonework. Of the obsidian total at the site therefore the greater part would be attributed to Vinča Tordoš, and it may be remarked that this coincides with the period of the Bükk culture. Obsidian has also been found in Vinča A levels in the excavation by Gh. Lazarovici at Gornea on the Danube in Roumania, where flotation was carried out in 1973 and 1974, and this is being analysed in connection with the present work.

To 1957 also belongs the sixth edition of Gordon Childe's "Dawn of European Civilization" representing his opinion to that date on obsidian. He notes that it was "commonest in Miljčić's phase B" at Vinča (Childe, 1957; 91), which was indeed the impression given by earlier publications without quantification, although as we have seen, the work of Srejović and Jovanović (1957) would tend to place the maximum early in Vinča-Tordoš. Childe also felt that it "presumably came from north-east Hungary down the Tisza. With it came pots such as were being made along that river, first Körös types . . . then Tisza" (Childe 1957; 91). We would now perhaps assign some of the pottery at Vinča once called 'Tisza' to the earlier Szakalhát-Lebő group, and as Childe (1957; 112) says, obsidian may no longer have been imported in the Tisza culture. But apart from this it is interesting that his thinking about possible modes and mechanisms of distribution still has some validity. The most recently available analyses do show that two pieces of obsidian from Vinča are not of Mediterranean, but of central European origin (Aspinall, Feather and Renfrew 1972). The Tisza and other rivers including the Danube have probably been underemphasized as modes of communication, although cases such as the

* Millennium b.c. in radiocarbon years.

Kisapostag cemetery and its relations along the Danube in the Early Bronze Age seem clear enough examples. And as regards mechanisms of pottery distribution, there are enough analogies, for example in west Africa, to render untenable the idea that pottery groups, or "cultures", correspond directly with human social groups. Even within modern Roumania pottery is widely distributed from its centres of manufacture to entirely different social groups; for example by potters from among the Moşii people, of the Apuseni mountains, over wide areas of the Banat and Transylvania. Roumanian ethnographers have also documented the extensive redistribution of traits other than pottery from their centres of manufacture over the whole of Roumania (e.g., Dunăre. N. 1967).

Childe also conceived of the Bükk culture as "controlling" the obsidian deposits of the Hegyalja (Childe 1957; 110) and Harghita is no longer mentioned by him. He remarks on the fact that obsidian is found all over the Lengyel culture area, in the fourth millenium, but in the northern Lengyel only in the earliest period "as if stocks had been brought but not replenished" (Childe 1957; 113), and he also notes triangular obsidian arrowheads in the Bodrogkeresztúr culture.

In 1959 Sagatovici, Arion and Popescu wrote a geological article on the perlites of the Oaş region to which reference will be made in connection with the fieldwork on that region discussed later on, but the geological literature which might bear on obsidian is henceforth too extensive to summarize. In the 1960s Vertés among others continued to examine the archaeological distribution of lithic materials including obsidian (e.g. Vértés 1960) and at the end of that period Vértés' conclusion, seen from the Hungarian point of view, remained that "apart from the Caucasus and Greek islands" obsidian is found in only one significant locality – the Tokaj Mountains (Vertés 1969; 231). But in the same year Comşa published his invaluable survey of the use of obsidian in the Roumanian neolithic, in which he maps seven regions in Roumania as obsidian sources. In view of the literary history of these sources it was clear that only fieldwork could resolve them individually, and this is one of the problems which was attacked in 1974. He further notes that obsidian occurs at Hust in the U.S.S.R. (Comşa 1969; 13) as well as in Slovakia which may be considered an extension of the Zemplén sources. In the five years before this however, analytical techniques had been applied to Near Eastern and Mediterranean obsidians and their sources (Cann and Renfrew 1964, Renfrew, Cann, Dixon 1965, Renfrew, Dixon and Cann 1966, Renfrew, Dixon and Cann 1968). Three sources including Mount Harghita are still being claimed in south-east Europe (Cann and Renfrew 1964; map, fig. 1), with a Slovakian source separated from Mount Tokaj. These analyses employed optical spectroscopy to detect trace-elements, a method which did not always discriminate successfully between sources. Fission track analysis was then employed (Durrani, Khan, Taj and Renfrew 1971), and most recently neutron activation analysis (Aspinall, Feather and Renfrew 1972) which is the method employed in the present research. Here again there is already a large literature, not confined to Europe, and one of the problems of sampling concerns the uniformity of composition of the source material (e.g. Bowman, Asaro and Perlman 1973). Due account has had to be taken of the nature

of the south-east European sources, which are not massive obsidian flows such as are found in other parts of the world, but seem in general to consist more often of explosion debris. A part of the recent approach to the problem has been the development of statistical techniques for discriminating between obsidian sources (Ward 1974). Archaeologically-based work has continued in eastern Europe (e.g., J. K. Kozłowski 1971, 1973 and 1974, Bánesz 1974).

Of the ideas which emerge from this survey, both concerning the sources themselves and the distributions of obsidian by human agency through space and time, some can already be disconfirmed by the present work in the field; some will stand; and some cannot be resolved until further fieldwork and analysis has been completed.

Fieldwork in Hungary and Roumania during 1974

We will now consider the 1974 fieldwork. This began in *the Tokaj-Zemplén region*.

Running northwards from the relatively isolated volcanic cone of mount Tokaj, at the foot of which the river Bodrog joins the Tisza, and lying between the rivers Hernád and Bodrog, are the Zemplén mountains (Zempléni-Hegység). These continue northwards towards the Slanské Vrchy in Slovakia and the Prešov region. Mount Tokaj projects into the flat lowland of the Alföld and rises to 515 metres (Plate XXI). The Zemplén Mountains reach 784 metres in Gergely-hegy; the foothills running parallel to the Bodrog between their southern point at Bodrogkeresztúr or Mád and the mountain of Sátoraljaújhely to the north-east are known as the Hegyalja. Consideration will not be given in this article to the obsidian sources lying within Slovakia, but the Košice Museum is as rich in archaeological obsidian as is that of Miskolc, and there are obsidian sources within modern Slovakia. For example one is claimed to lie 5 kms. from the Gravettian hoard of 41 obsidian bombs found at Cejkov (Bánesz 1974), and the site in question has up to 95% obsidian in the lithic industry.

The Zempléni-hegység are volcanic mountains, and lines of small cones are still discernible forming gentle slopes which are still covered predominantly with either dense unbroken forest (mainly of oak or other QMF consociations) or by vineyards. There is little conifer plantation. The soil is thick, but nevertheless, poor for agricultural purposes. It is rather acid and badly drained, but as is well known, the vine flourishes in the region. Loesses are also present and some of the Tokaj wine-cellars are cut into this. Apart from the numerous conical hills there are much broader more gently sloping areas which tend to be bare of trees, but may carry some scrub and are used for pasture. These superficially resemble large, gentle alluvial fans in appearance, but this is misleading for here they quite commonly represent lava flows or spreads of dejecta from a volcano, consisting of very varied volcanic rocks.

The obsidian sources in the Zempléni-hegység seem to consist mainly of obsidian bombs blown out of the volcanoes and scattered over the areas in question, which as can be seen from Szádeczky's account, consist of two main rhyolite areas, one in the south in

the south-western Hegyalja and up towards Abdujszanto; and the other in the north around the Bozsza drainage. Pumice occurs, and some of it does show signs of stratification. There are no massive, solid obsidian flows, but obsidian occurs as bombs with maximum dimension from about 12-17 cms. (as far as is known) downwards. In the Gravettian or the Bükk cultures there are hoards to indicate that it was thought worth collecting bombs of about 4-5 cms. diameter, ranging up to 6-7 cms. In Miskolc Museum a conical micro-core was seen in 1962 (Inventory No: 53. 160. 163) among the Bükk material from Borsod-Derékegyháza which was not rejected until it had reached a maximum dimension of c. 2.2 cms. The raw material, in the shape of bombs, may be more or less spherical and when in an uneroded situation is likely to have a perlite, ash or debris coating. When eroded out (and it seems very likely that a major source for early man would have been stream-bed or gully situations such as at Olaszliszka) the surface has a pitted, sometimes pumice-like, grey cortex with curved grooves and gas holes, and is shiny black only in fracture. It may occur down to the size of the small pellets described from the source at Bodrogkeresztúr Lebuj-Kanjar.

In archaeological terms two periods are already known to have been particularly associated in this region with the exploitation of obsidian. The Bükk culture belongs to the neolithic of the second half of the 5th M.b.c. and early 4th M.b.c. (and thus contemporary with the period of maximum use of obsidian at Vinča in Vinča-Tordoš). The Bodrogkeresztúr culture, whose eponymous site lies by the Bodrog on the neck of land joining Mount Tokaj to the Hegyalja, belongs to the period around 3000 b.c. Some of the implications of incorporating obsidian in the economic mechanism of the Bodrogkeresztúr period, among other raw materials such as copper and gold, have been alluded to above. As regards the Bükk settlements, these are often at high altitudes in the hills, e.g., the newly discovered site at Erdőhorváti Szelek-fej visited in company with Dr. Kalicz in 1974, which lies at 350-400 metres. The culture also occurs in caves in this region of north-east Hungary and eastern Slovakia. In the Zempléni-hegység the Bükk sites can often not have relied absolutely on agriculture, the soils are extremely poor, accounting for the still almost universal forest cover, and some other economic emphasis might be sought. They have a rich obsidian industry, but also a rich lithic industry in other materials, including flint, chert-like white stone blades and flakes reaching about 8 cms., and other coloured stonework, together with polished axes of rectangular section and outline. Such sites may have been involved in seasonal pastoralism.

On the basis of work carried out in the north, especially by Kalicz and Makkay, and in the south by Kutzian and Trogmayer, the chronological picture proposed for the northern Tisza drainage could be summarized as follows, and compared with the southern Tisza drainage (from about Szolnok southwards).

Fieldwork in the Zempléni-hegység during 1974

The following sites were examined during the 26th-27th July 1974 in company with Dr. N. Kalicz. In addition the material from the sites underlined thus in the table was

THE SOUTH-EAST EUROPEAN SOURCES OF ARCHAEOLOGICAL OBSIDIAN

TABLE 1

<u>Voivodina</u>	<u>Southern Tisza drainage</u> (<u>BODROGKERESZTÚR</u>)	<u>Northern Tisza drainage</u> <u>BODROGKERESZTÚR</u>
VINČA. D.	<u>TISZAPOLGÁR</u>	<u>TISZAPOLGÁR</u>
VINČA C	<u>TISZA</u> (following on Szakalhát-lebő with an elaboration of incised design.) (Early Lengyel in N.W. Hungary, e.g. <u>Aszód.</u>)	<u>HERPÁLY</u> (following Esztár and Bükk styles) <u>CSÖSZHALOM</u> (following on Szilmeg, Bükk and Szamos styles.) e.g. <u>Sárospatak</u> . Also some Stichbandkeramik in northern Hungary.
VINČA B	<u>SZAKALHÁT-LEBŐ</u> (on the Tisza, with incision and some encrusted painting and burnish)	<div>DIFFERENTIATED BK and painted BK groups</div> Szilmeg (localized unpainted in Eger region), and Sátorlajújhely/Esztár/Bükk groups, including painted wares. (e.g. <u>Erdőhorváti Szelek-fej.</u>) <u>Tiszadob</u> (e.g. <u>Baskó</u>)
VINČA A	Early <u>ALFÖLD</u> Bandkeramik = <u>BARCA III</u> Bandkeramik (Slovakia and <u>Ószentivan VIII</u> and some Vinča in the south)	
STARČEVO F.T.N.	<u>KÖRÖS</u> group of the First Temperate Neolithic.	<u>LATE SZATMÁR</u> (<u>Tiszacsege</u> , Rétközberencs, Tiszavalk: <u>Nagyecséd</u> , <u>Bezdad.</u>) <u>EARLY SZATMÁR</u> (<u>Méhtelek</u> , <u>Homorod</u>)

(Sites underlined thus were sampled for obsidian analysis.)

sampled for obsidian and other analyses. The location of sites is primarily shown by Map 2, with only such additional detail in the text as may be necessary to define their position.

Mount Tokaj Bodrogheresztúr Lebúj-Kanjar. Geological source. c. 100 metres a.s.l.

Contorted and laminated strata visible in the quarry south of the road in the bluff where the Bodrog first comes up against Mount Tokaj. There are both red and grey strata, weathering into the very friable condition characteristic of perlites. There are obsidian granules which do not usually exceed 8 mm. in size, mainly in the grey matrix (Plate XXIX). These get eroded and wash down the slope. Volcanic dejecta and gas holes are present in this material.

The obsidian pellets were sampled to characterize the source. They are clearly of a size which is useless for lithic technology.

Tolcsva. Térhegy. Geological source. 300-350 metres a.s.l.

Two localities were sought on the mountain west of Tolcsva by approaching from Erdőhorváti. These are Csepego-forrás (Csepego spring) and Bartalus-tető (Bartalus hill), on the north and south sides of the saddle running west from Térhegy. Although not located, because of the limited time at our disposal and the heavy forest cover, these clearly correspond to the Térhegy source described by Szádeczky 1887. (See Fig. 1.)

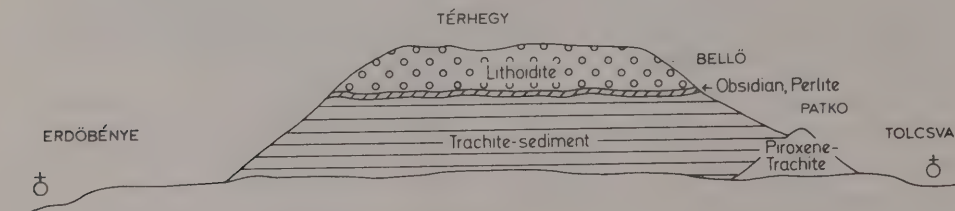


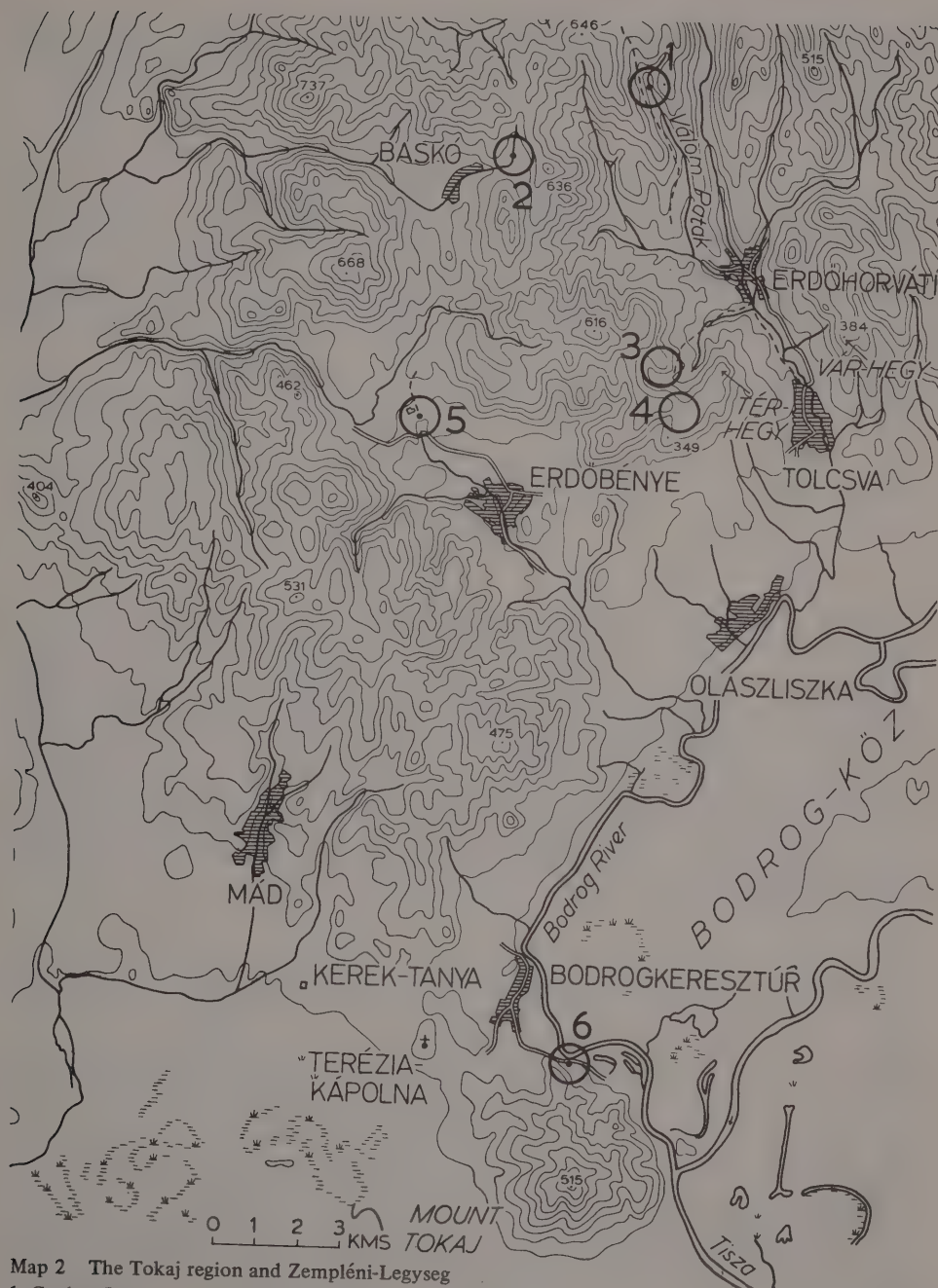
Fig.1.

There is a Bükk site on Várhegy (384 metres) to the north-east of Tolcsva, some four kilometres from Térhegy. (Map 2.)

Erdőbénye. Liget Major. Geological source. c. 200-250 metres a.s.l.

An obsidian field lies along the gully running north towards Liget Major from the bend of the road to Sima, c. 3 kms. west of Erdőbénye. The obsidian sampled is sometimes light in weight with a pitted pumice-like cortex, the smaller pieces (c. 3-4 cms.) dull grey in colour, the larger ones (c. 5-7 cms.) shiny black in fracture, some showing banding (Plate XXVIII). There are no worked pieces, and the shapes are irregular. The obsidian occurs amongst a much more abundant scatter of very varied hydrothermal

THE SOUTH-EAST EUROPEAN SOURCES OF ARCHAEOLOGICAL OBSIDIAN



products, including various chalcedonies, quartzes, agates, and also chert-like rocks, many of them very hard. Obsidian up to about 7 cms. was found, and could well have been used for blade production.

Erdőhorváti. Szelek-Fej. Archaeological site. c. 350-400 metres a.s.l.

A newly discovered Bükk site, lying in the valley of the Váalom patak c. 4 kms. north by north-west of Erdőhorváti, west of the hill of Gyakar-som. Among the abundant archaeological material in the course of erosion in small gullies what appears to be a hoard of obsidian was found (Plate XXVI) consisting of bombs, weighing a total of 3.04 Kgs. with the following dimensions:

<i>Weight in grammes</i>	<i>Maximum dimension; cms.</i>
1007	17
516	12
487	8
326	9
317	8.5
283	8.5
104	5.5

These were excavated from an eroded surface and were lying close together, apparently *in situ*.

The site is extensive, c. 500 metres long, lying up a sloping valley bottom, the width unknown because of forest cover. There is a considerable depth of soil under the forest. Early Bükk material lies higher up the valley, and late Bükk lower down. The pottery includes the fine multiple-incised pointed arches with red incrustation characteristic of the Bükk assemblage, broader incised arcs, and fine black wares, with much vegetable tempering. The stonework is abundant, including in addition to worked obsidian the white chert flakes and rectangular section axes already mentioned for this culture. This high-level site is on poor soil.

Baskó. Legelő. Archaeological site. 45-500 metres a.s.l. (Plate XXVII)

In the valley head beyond the village of Baskó on the upper Horváth-kút patak (legelő = pasture) (Plate XXIV). Samples from a hoard of small obsidian bombs, c. 5 cms. in diameter, from this site had already been given to us by Dr. Kálicz. The material includes latest Alföld pottery, Tiszadob, and early Bükk pottery. There are Bükk coarse wares, and finer black wares which have plant impressions in them. The coarse wares include shapes with a finger-impressed cordon lying in a concave carination which are common in Bandkeramik contexts, and large sherds of thick-based pots with relatively thin walls.

Samples of archaeological obsidian were also taken from the early "Szatmár group" site of Méhtelek excavated by Kálicz and Makkay, and from the later Szatmár sites of Nagyecséd and Tiszacsege.

Fieldwork in Transylvania in 1974

The claims for obsidian sources in Transylvania come from three main regions, as can be seen from the survey of the literature:

Eastern Transylvania:—	Mount Harghita Perşani
South-west Transylvania:—	Valea Bradului Săcărimb Techerău Glod Cserbel
North-central Transylvania:—	Cluj (Someşul Mic) Leleşti Ciceu

All these were visited during August 1974 or evaluated locally, as well as additional sources listed below (Map 1).

Eastern Transylvania:—	Harghita — Nagy Kosag
South-west Transylvania:—	Roşia Noua
North-central Transylvania:—	Valea Săcuieului Porolissum Tibleş Oaş-Negreşti

Archaeological sites were also visited and obsidian samples taken. Some of the claimed sources were associated with obsidian in a geological sense, for example as a component of Dacite (Valea Săcuieului) or in the interstices of pillow lavas (Roşia Noua), but the weight of geological opinion combined with this one season of field work, is against the presence at these sources of obsidian in an archaeological sense, as it seems commonly to have been envisaged over the last century. The case of one of the best known, that of Mount Harghita, is one of the most interesting in showing the way confusion can arise. The areas in question are indeed volcanic, and perlitic and geological obsidians do occur. Since they constitute negative evidence, however, the sites in question must be described in sufficient detail to eliminate them as sources for archaeological obsidian. Map references are to the 1:200,000 *Generalkarte von Mitteleuropa* unless otherwise specified. The Roumanian Geological Survey at 1:200,000 (on which many of the features discussed can be seen) was also used, as well as maps at larger scales.

Mount Harghita — Opálbarlang. Geological site. 814 metres a.s.l.

1:200,000 sheet 43°46'. 43°16'E x 46°19'N, by the 'K' of Somkö Lata.

Synonymous with Băile Chirui or Kirujfördő in literature.

This site is described by Bányai 1957; 159 and Fig. 14. His map is redrawn here with amendments (Fig. 2), Opálbarlang (Barlang = cave) is a mine tunnel, cut in an area with numerous other surface diggings, all directed to recovering opalates. It lies off the road from Miercurea Ciuc (Csik Szereda) to Odorhei (Székely-Udvarhely) across Mount Harghita, in the valley of the Köves stream. The Tolvajos stream in particular is heavily

Mt Harghita: (area M on Map 1.)

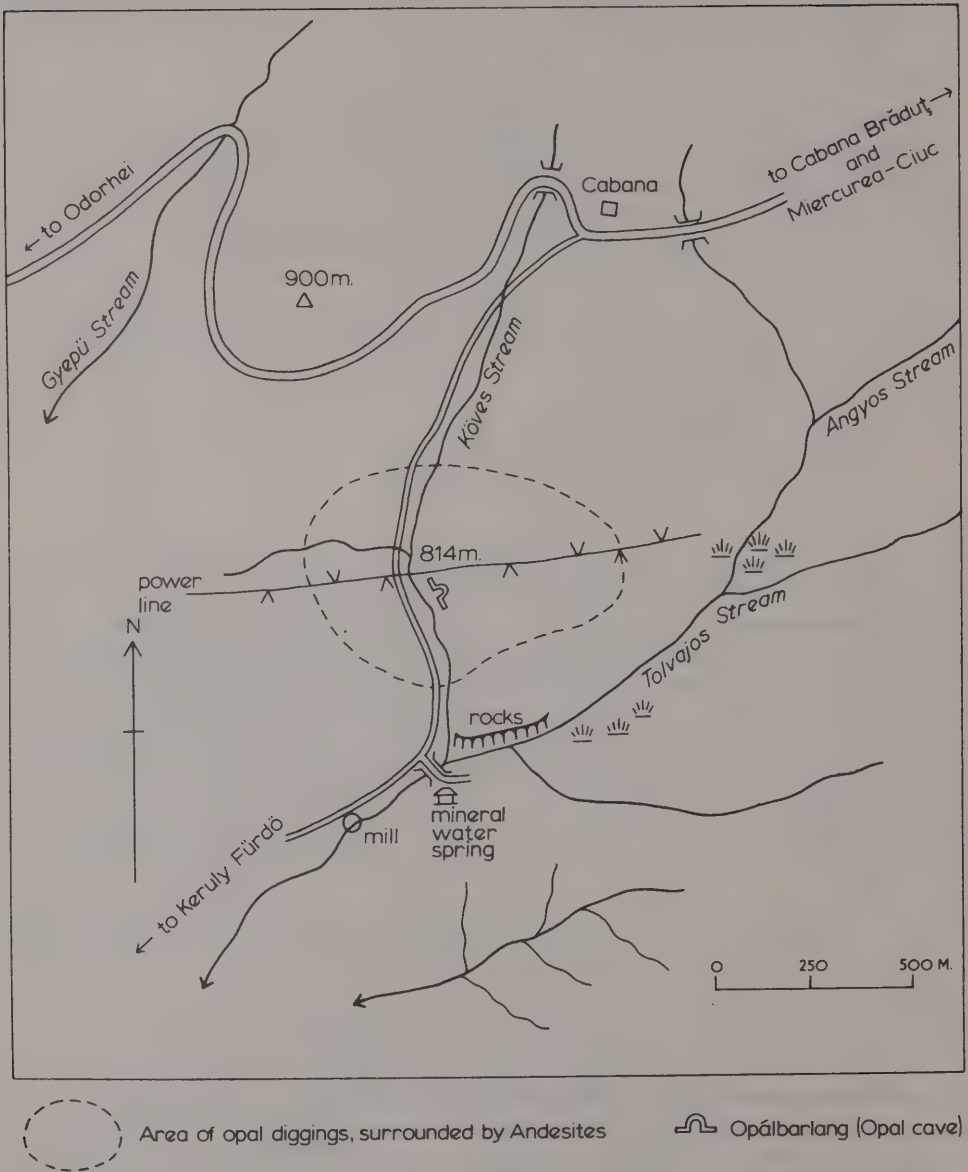


Fig.2.

chalybeate and there is a mineral water spring nearby. The small mine entrance lies just south of the power line and is much overgrown. The opal is friable and the mine extends well back but is in a dangerous condition. Among the opal are seams of 'lignite' with clear leaf impressions. Black, opalescent, yellow, black-and-white varieties are present, and when fired they produce a red powder which crushes into the pigment for which the workings were made. Andesites surround the region of the diggings.

The black opal in particular is a clear confusion with obsidian. Fresh blocks have more or less conchoidal fracture, and are shiny black. In transmitted light thin pieces show a brownish colour unlike any obsidian; the opal is lighter in weight than obsidian (Sp.gr. of opalite 2.035; of obsidian 2.394).

This material may well have been confused with obsidian in the nineteenth century and the source accepted as such ever since.

There is a small worked flake among the obsidian in Sf. Gheorghe Museum, a surface find from Băi Malnaş (Dîmbul Füvenyes) (Inventory No: 2151), which appears to be black opal very similar to that from Opálbarlang. Its presence on an archaeological site is worth noting, in that some use may have been made locally of this material. It may even have been passed off as obsidian in antiquity.

Harghita. Nagy Kosag. Geological site. c. 800 metres a.s.l.

1:200,000 sheet 43°46'. 43°20'E x 46°11'N. Synonymous with Filia (Füle).

Located in the middle course of the valley of the Nagy Kosag (Valea Coşag) under the east side of Nyerges hill (847 metres), some 4 kms. N.E. of Brăduţ (Bardocz).

This is another occurrence of a dark opal (Füst-opál = smoky opal), which should be noted in the context of the case of Opálbarlang. It is worth emphasizing that archaeological surface finds of true obsidian as cores and tools are fairly concentrated in the region of Brăduţ, and that Upper Palaeolithic flintwork from here is also present in Sf. Gheorghe Museum.

This source is mentioned by Bányai 1932 (*Vulkani Közeter a Hargitában*), among other sources of opal (i.e. hydrothermal products) in the Covasna judeţ, which should be noted here:

Doboşeni (la Bartabérc)

Brăduţ (Pîrîul Egres = Egres patak, east of Brăduţ, where obsidian tools were found)

Filia (= Nagy Kosag)

Herculian (Vashányás, Varjuvár, Bodvaj — also near Brăduţ)

Perşani Geological region.

In the area south of the Olt around Racaşul de Jos, Dopca, Bogata and ^{Heghij} ~~Lohij~~ there are to be found glassy basaltic scoriae pitted with gas holes, which constitute the nearest thing to obsidian to be found at this presumed source. Opal also exists in the Perşani region at Valea Rica near Racaşul de Sus. These are a waxy dull yellow (in Hungarian "liver-coloured"), such as does also occur at Opalbarlang, but black is not found. Work on the basaltic scoriae has been done by Josif Tövisi of the Catedra de Geomorfologie at Cluj University.

Turning to the south-west Roumanian sources, mainly lying in the Munții Metalici, mineralogically rich volcanic region of the southern Apuseni mountains (Plate XXII), which is important as a gold-bearing region in prehistory, there are a number of sites to be considered. There seems to be no question of obsidian occurring at the two sites of *Techerău* (1:200,000 Sheet 41°46'. 40°45'E x 46°6'N. Tekero) and *Săcărîmb* (1:200,000 Sheet 41°46'. 40°42'E x 45°59'N, nearly at 1046 metres). Both are mining areas, with a rich assortment of chalcedonies, onyx, agates, opals, bloodstone, and other rocks, particularly at Techerău, and of silicolites at Măgura near Săcărîmb. It may be that the Almaș mentioned in the literature as an obsidian source is the Almaș de Mijloc of the region between these two sites, rather than that in the Sălăj region south of Zalău, which was also visited in 1974.

The site at Valea Bradului also produced evidence of a possible confusion for obsidian, and a new source was visited in the Zarand mountains (Roșia Noua) which produced geological obsidian.

Valea Bradului. Geological site. c. 350 metres a.s.l.

1:200,000 Sheet 40°46'. 40°28'E x 46°8'N.

There are two sites here, at Măgura and at Dealul Sănătoriului, both lying immediately north-east of the town of Brad on the east side of the Valea Bradului.

At *Măgura* the hillside is covered with volcanic bombs and other ejecta, including blocks of Andesite, from the volcanoes of the Munții Metalici visible across the valley of the Crișul Alb to the south. No obsidian was found among these.

At *Dealul Sănătoriului* further north-east along the same road, below the westerly slope of the Sanatorium and therefore actually in Valea Bradului, there are solid outcrops of red and yellow jaspers and silicolites, with chalcedonies, opals and agates. There are darker chloritic masses (perhaps lyddites) which may well have been confused with obsidian, particularly if found in the stream bed in Valea Bradului in isolation. The jaspers fracture conchoidally, particularly if fresh, but do not seem to have been especially used in prehistory.

Roșia Noua. Geological site. c. 400 metres a.s.l.

1:200,000 sheet 40°46'. 40°6'E x 46°7'N.

Ianovici, Ghiușca and Ghițulescu (1969) noted the occurrence of pillow lavas in the Zarand mountains, between the Mureș and White Criș rivers. They described the occurrence of a glassy material, largely chloritized, in the interstices between the ellipsoid pillows, and the occurrence of pyroclastic rocks formed only of "tachylitic glass". (Ianovici, Ghiușca and Ghițulescu 1969; 283-4). There are also perlites and pillow lavas in the southern Zarand mountains, which were not visited in 1974.

Roșia village is clearly named after a distinctive red rock which occurs in the valleys and streams and overlies the pillow lavas, which were visited in several localities and which have glassy matter in the interstices, resulting from rapid submarine cooling. These

again, even if related to obsidians, are not archaeologically usable. The two main localities are:

a) *Pîriul Drumul Radei*; the valley starts at the disused water wheel in Roşia running north-west towards the peak of Măgurilor (721 metres). Pillow lavas form the south side of the upper valley, running under red rock on the northern side. Glassy matter was present, which weathers rapidly.

b) *Pîriul lui Marcu*. Further up the valley beyond Roşia almost to Obfşia pillow lavas occur at kilometre 16 in the main valley and up the left (western) fork before the church, again with glassy matter in the interstices. This again rapidly weathers to a friable state.

Glod and Cserbel

These sites in the Hunedoara south-west of Deva are claimed as obsidian sources. Time was not devoted to visiting the region in 1974, since from a geological point of view the area is crystalline and metamorphic, with quartzites, dolomites and other rocks and seems very unlikely to be a geological, as opposed to an archaeological source. It is also far enough from acid lavas for it to be unlikely that the explosive effects associated with acidic vulcanicity spread any explosion debris over it. Basic magmas tend to ooze up and spread out, but Roumanian geologists do nevertheless sometimes hold that obsidian may be associated with the basic rocks (e.g. basalts) of Neogene vulcanism.

Cluj

The banks and gravels of the Someşul Mic near Cluj have been claimed to contain occasional obsidian pebbles. The river was surveyed on two occasions between Cluj and Gilău, and at Gilău itself where the combined Someşul Rece and Someşul Cald join the Someşul Mic. The only plausible source here would be the andesite outcrops on these two rivers, which have been used as the foundation of a recent dam. No obsidian was found; the stream boulders are mainly metamorphic and crystalline rocks, deriving from the Gilău mountains, and unlikely to be associated with obsidian.

Valea Săcuieului. La Henţ. Geological site. c. 500 metres a.s.l.

1:200,000 sheet 41°47'. 40°32'E x 46°51'N.

In the Vlădeasa mountains west of Huedin in the valley of the Săcuieu there are andesites and some granites, and obsidian occurs as a component of Dacite which consists of up to 50% glassy black obsidian under the microscope. This can be found at the quarry of La Hent at the first bridge on the road up the valley from Bologa, where the road crosses onto the right bank. It also exists in the next valley to the west, Valea Draganului where at Lunca there is a vitreous rhyolite called "Liparite". Neither of these are archaeologically viable, but since they lie near an area close to the Crasna mountains north of Cluj, where Roska's map (1942) shows a great many sites with archaeological obsidian, they are worth eliminating specifically as potential sources. The stream bed in this valley was also examined.

Porolissum. Dealul Măgura, Dealul cu Cremenei. Geological site. c. 500 metres a.s.l.

1:200,000 sheet $41^{\circ}47'$. $40^{\circ}49'E \times 47^{\circ}11'N$. (Plate XXIII).

Also closely related to the dense distribution found in Roska 1942 is the volcanic neck (Dealul Măgura) of Porolissum near Zalău in the northern Meseşul mountains, with its Dacian cemetery on top. Obsidian was reported to come from the region and on geological grounds this seemed quite feasible. An area was examined on the western side of the valley bowl opposite Măgura, named Dealul cu Cremenei after the volcanic products lying on the surface, but no obsidian appears to exist. Instead there is a scatter of hydrothermal products, many of them very hard, and tuff lying on a limestone surface which contains large *Gryphea* fossils, 20 cms. or more in diameter.

Oaş-Negreşti. La Mujdei. Geological site. c. 250 metres a.s.l.

1:200,000 sheet $41^{\circ}48'$. c. $40^{\circ}57'E \times 47^{\circ}49'N$.

Perlites occur in a restricted area around Oraşul Nou in the centre of the Oaş region, where the earliest archaeological obsidian so far known is documented, from the Aurignacian (Al. Păunescu 1970: M. Bitiri 1972). The geological map (Roumanian 1:200,000 Geological Survey, sheet 3) clearly shows the restricted area over which fine pyroclastic rocks occur here overlying biotites andesites. Some of the friable perlites are dark in colour, and this is an extrusive and acidic phenomenon comparable to Tokaj Lebuş-Kanjar but without the red matrix and without the small beads of pure obsidian. Hand specimens of the perlites from Tokaj and La Mujdei are virtually identical. The material consequently is not archaeologically usable obsidian. At Oraşul Nou perlites occur at several points according to the study by Sagatovici, Arion and Popescu (1959). The quarry at La Mujdei was visited in 1974, close by Dealului Ciap. On Dealului Negru they occur on the north slope on both sides of a stream which rises on the hill, in an outcrop 35 metres long by 10 metres thick east of the stream, and in two zones on the west side. At Dealul Nucilor they occur on the south-east side in a quarry 30 x 40 metres with quartz, chalcedony, etc. Perlites are also found near Homorod on the right bank of the Trestios (Nadoş) stream at Medieşul Aurit.

Țibleş-Lăpuş Group. Piatra Hudinele, Arcer. Geological sites. In the Țibleş massif. (1842 metres)

1:200,000 sheet $42^{\circ}48'$. $41^{\circ}56'E \times 47^{\circ}31'N$.

Țibleş rises to 1,842 metres and consists of three peaks, Bran, Țibleş; and the westernmost, Arcer, which is the source of a black obsidianic andesite similar to the Dacite from La Henţ. This is also found down the Valea Bradului, which runs from Țibleş into the Lăpuş valley, at Piatra Hudinule. The area did not produce any archaeologically usable obsidian in 1974.

Leleşti-Ciceu. Geological site. c. 758 metres a.s.l.

1:200,000 sheet $42^{\circ}47'$. c. $41^{\circ}38'E \times 47^{\circ}15'N$.

Ciceu near Reteag is cited by Popescu-Voiteşti (1925) as an obsidian source, and

Lelești by Roska (1925) as a source "in trachyte tuff". Lelești-Ciceu is cited by Comșa (1969) and the two are effectively the same locality. This lies into the southern foothills of the Lăpuș mountains, north of Reteag in the valley of Someșul Mare. At the base of a prominent rock, (Plate XXV) upon which Petru Rares held a castle (outside his own Moldavian domains), there is a hard tuff with black inclusions, which has been extensively used until recently for millstones. This was sampled to determine the exact nature of the inclusions, but this seems to be the origin of the claim for obsidian at this site. Archaeologically usable obsidian does not exist.

Conclusion

A quite short but fairly intensive period of fieldwork has sufficed to indicate that the majority of the claimed sources of obsidian in south-east Europe are literary rather than geological in origin. The most hopeful candidate for geological sources is the Zempléni-hegyseg in north-eastern Hungary and adjacent regions. Even here satisfactory sources have not been visited yet, although a great many sites were covered in the two days available for the 1974 fieldwork in that particular region. Since it seems likely to be the major continental European source for obsidian it is clearly necessary to devote more attention to the area, with the special aim of characterizing these sources. If the present work serves to draw attention to other sources in Transylvania which have so far remained unknown it would be very satisfactory. But the known sources there have been evaluated in the manner described, and the great majority of them visited, along with some new ones of equal plausibility; all of these seem to be discredited.

The analysis of archaeological obsidian should throw light on several topics of importance which have not been explored yet in south-east Europe, as they have been to some extent in Mediterranean and Near Eastern regions. The analysis of redistribution patterns over a time range which we know to go back to the Aurignacian is one of these. In the early neolithic the question of the relationship between the First Temperate Neolithic, (including the Körös, Criș and Starčevo groups) and the Greek Neolithic, via the Macedo-Bulgarian zone (Nandris 1970), must include the problem of when and where the distribution of Melian obsidian ends and that of intra-Carpathian obsidian begins. In the later developments of the neolithic there are certain periods, such as the notenkopf Bandkeramik of Moldavia, the Bükk culture, and the Bodrogheresztúr culture, when information derived from the distributions of obsidian could be of particular interest. It is hoped that it will prove practicable to pursue these and other questions further in the near future.

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Abstract

Obsidian occurs as a redistributed natural resource on archaeological sites in south-east Europe from at least the Aurignacian period. In order to trace the patterns of this distribution fieldwork was undertaken in 1974 on the many geological sources claimed for obsidian in this area, during the course of other palaeoenvironmental and palaeoeconomic work. Archaeological obsidian was also collected, but the main purpose was to characterise the geological sources in the course of the current programme of neutron activation analysis of obsidians from the region. It became clear that many of the claimed sources derived from literature rather than fieldwork, over the last century, and the paper first outlines the history of research to show how this situation may have arisen. There are indeed sources of obsidian in the area; but the case of one of the most famous claimed sources, Mount Harghita, seems to show how a long-standing confusion between black opalates (hydrothermal products) and obsidian arose in this particular instance, as long ago as the beginning of the century. The sites visited are described, mapped and located in sufficient detail to facilitate their verification, some indication of archaeological context is given, and both fieldwork and analyses continue on the several aspects of this problem.

REFERENCES

- Andrieşescu, I. 1912. *Contribuție la Dacia înainte de Romani*. Iași.
- Aspinall, A., Feather, S. W. and Renfrew, C. 1972. Neutron Activation Analysis of Aegean Obsidians. *Nature*, vol. 237, No: 5354; 333-4.
- Báñez, L. 1974. Hromadný nález obsidiánovej suroviny na Gravettskom sídlisku v Cejkove. *A. R. XXVI/1*; 51-54.
- Bányai, J. 1932. A Hargita déli nészének opálos lerakódásai. *Akad. Mat. Term. Értesítő* (Budapest).
- Bányai, J. 1957. A Magyar Autonóm Tartomány hasznosítható asványi kincsei. (Useful mineral resources of the Magyar Autonomous Region). Tudományos Könyvkiadó. (Editură Științifică) Bucharest.
- Barta, J. 1960. Zur Problematik der Höhlensiedlungen in der Slowakische Karpaten. *A. A. Carpathica II*; 1-39.
- Beudant, 1818. Voyage mineralogique et géologique en Hongrie. (2 vols.)
- Bitiri, M. 1972. Paleoliticul în Țara Oașului. *Biblioteca de Arheologie* (Seria Complementară) 1. Bucharest.
- Bowman, H. R., Asaro, F. and Perlman, I. 1973. On the uniformity of composition in obsidians and evidence for magmatic mixing. *Journal of Geology* 81; 312-327.
- Cann, J. and Renfrew, C. 1964. The characterization of obsidian and its application to the Mediterranean region. *P.P.S.* 30, 111-133.
- Childe, V. G. 1929. *The Danube*. Oxford.
- Childe, V. G. 1957. *The Dawn of European Civilization*. Routledge and Kegan Paul.
- Comşa, E. 1969. L'usage de l'obsidienne à l'époque néolithique dans le territoire de la Roumanie. *Acta Arch. Carpathica XI/1*; 5-16.
- Dixon, J. E., Cann, J. R. and Renfrew, C. 1968. Obsidian and the origins of Trade. *Sci. Amer.* 218 March 1968; 38-46.
- Durrani, S. A., Khan, H. A., Taj, M. and Renfrew, C. 1971. Obsidian source identification by fission track analysis. *Nature* vol. 233; 242-5.
- Dunăre, N. 1967. Rolul satelor specializate în meșteșuguri. *Apulum VI*; 536-556.
- Gábori, M. 1950. Az ősközi obsidiánkereskedelem néhány problémája. *AE.* 77, 1950; 50-53. (=)
- Gábori, M. 1950. Quelques problèmes du commerce de l'obsidienne à l'âge Préhistorique. *AE.* 77, 50-3.
- Ianovici, V., Giusca, D., Ghițulescu, T. P. et al. 1969. *Evoluția Geologică a Munților Metaliferi*. Edit. Acad. R.P.R.
- Janšák, Št. 1935. *Praveké sídliska s obsidiánovou industriou na východnom Slovensku*. Bratislava.
- Kosztrowski, J. 1939. Obsidian implements found in Poland. *Man* 30; 95-98.
- Kozłowski, J. K. (Ed.) 1971. *Etudes sur industries de la pierre taillée du néo-eneolithique*. Cracow (Arch. Mus.) (Nowa Huta Symposium).
- Kozłowski, J. K. 1973. The origin of lithic raw materials used in the Palaeolithic of the Carpathian countries. *A. A. Carpathica XIII*, 5-19.
- Kozłowski, J. K. 1974. Über die untersuchungen der östlichen Peripherien der Linien-Bandkeramik Kulture. *A.A. Carpathica XIV*; 5-56.
- Kulczycka, A. and Kozowski, J. K. 1960. Pierwsze materialy kultury Bukowogorskiej na Polnoc od Karpat. *A.A. Carpathica II*; 41-54.
- Marțian, I. 1909. Archaeologisch-praehistorisches Repertorium Siebenburgens. *Mitt. Anth. Ges. Wien* 39; 321-358.
- Marțian, I. 1920. *Repertoriu Arheologic pentru Ardeal*. Bistrița, 1920.
- Nandris, J. G. 1970. The Development and Relationships of the Earlier Greek Neolithic. *Man* Vol. 5, no. 2, June, 1970; 192-213.
- Nandris, J. G. 1972. Bos Primigenius and the Bone Spoon. *Bulletin London Univ. Inst. Arch.* 10; 63-82.
- Orosz, E. 1911. Erdélyi obsidian-nucleus leletekről. (Obsidian-nucleus Funde in Transylvanien). *AE XXXI*; 275-77.
- Papiu, C. V. 1959. *Erupții vulcanice submarine*. Edit. Științifică, Bucharest.
- Păunescu, Al. 1970. *Evoluția uneltelor și armelor de piatră cioplită descoperite pe teritoriul României*. Bibl. de Arheologii XV). Edit. Academiei, Bucharest.
- Popescu-Voitești, I. 1925. Obsidiana și silexurile. *Arhivele Olteniei IV*, fasc. 21-22, Sept-Dec. 1925; Craiova; 426.
- Renfrew, C., Cann, J. R. and Dixon, J. E. 1965. Obsidian in the Aegean. *Ann. B.S.A.* 60; 225-47.
- Renfrew, C. 1970. Trade and Culture Process in European Prehistory. *Current Anth.* 151.
- Renfrew, C., Dixon, J. E. and Cann, J. R. 1966. Obsidian and early cultural contact in the Near East. *P.P.S.* 32; 30-72.
- Renfrew, C., Dixon, J. E., and Cann, J. R. 1968. Further analysis of Near Eastern obsidians. *P.P.S.* 34; 319-331.

- Richthofen. 1860. Studien aus den ungarisch-siebenbürgischen Trachytgebirgen. *Jahrbuch der K.K. geol. Reichsanstalt* VI, Jahrgang 196.
- Rómer, F. 1869. Ismét néhány szó az obsidián-eszközökről. *AE* I; 56-9.
- Roska, M. 1925. Ceva despre obsidiană. *Arhivele Olteniei* (Craiova) IV, No: 17, Jan-Feb. 1925; 168-170.
- Roska, M. 1933. Beiträge zu den vorgeschichtlichen Handels-kultur und Völker-wanderungswegen Siebenburgens. *AE* XLVII (1932/33); 149-58 and p. 209.
- Roska, M. 1942. *Erdély Régészeti Repertoriuma* Cluj. (Thesaurus Antiquitatum Transylvanicum, Vol. I Praehistorica).
- Sagatovici, A., Arion, F. and Popescu, I. C. 1959. Contribuțiuni la cunoașterea Perlitelor din Țara Oașului. *Comunicări de Geologie Geografie*, I 1957-59; 45-50.
- Saru, H. 1962. Asupra unor iviri de roce ultrabazice din partea centrală a geosinclinalul Mureșului. *Dări de Seamă Com. Geol.* XLV (1957-8); 59-69.
- Srejšović, D. and Jovanović, B. 1957. Pregled Kamenog oruda i oružja iz Vinče. *Arh. Vestnik* 1957. 256-296.
- Stanciu, V. 1937. Linia de Eruptiv Harghita. *Lucrările Institutului de Geografie al Univ. de Cluj*. Vol. VI; 3-12.
- Szabó, J. 1866. Tokaj-Hegyalja földtani viszonyai. *Akad. Közl.* IV köt. 1865-66; 426.
- Szabó, J. 1867. A Tokaj-Hegyalja Obsidiánjai. *A magyarhoni földt. társ. munk.* III kötet; 147-172.
- Szádeczky, Gy. 1887. A magyarországi obsidiánok, jülönös tekintettel geológiai viszonyaikra. (Obsidian from Hungary, especially from a geological point of view). *Ertekezések a Természettudományok Köreiből*. (XVI kötet, 6 szám. 1886) pp. 1-64. Edit. Magyar Tudományos Akadémia; Section III.
- Tóth, M. Magyarország ásványai, Különös tekintettel terunő helyeik megállapítására.
- Vertés, L. 1953. Az őskőkor társadalmának néhány kérdéséről. *AE*. 80; 89-105.
- Vertés, L. 1960. Aus Polen stammenden Silexmaterial im ungarischen Paläolithikum und Mesolithikum. *A.A. Carpathica* I; 166-173.
- Vértés, L. 1969. *Kavicsösvény* (Pebble Culture) Budapest.
- Ward, 1974. A systematic approach to the definition of sources of raw material. *Archaeometry* 16/1; 41-53.
- Wright, G. A. 1969. *Osidian analysis and prehistoric Near Eastern trade, 7500-3500 B.C.* Anthropological Papers, Museum of Anthropology, Univ. of Michigan, No. 37.



Plate XXI Mount Tokaj seen from the north-west near Kerek-tanya. Terézia-Kápolna chapel in middle distance beyond road. Plain of the Alföld to the right.



Plate XXII General view of the volcanic mountains of the Southern *Apuseni*, near Săcărîmb.

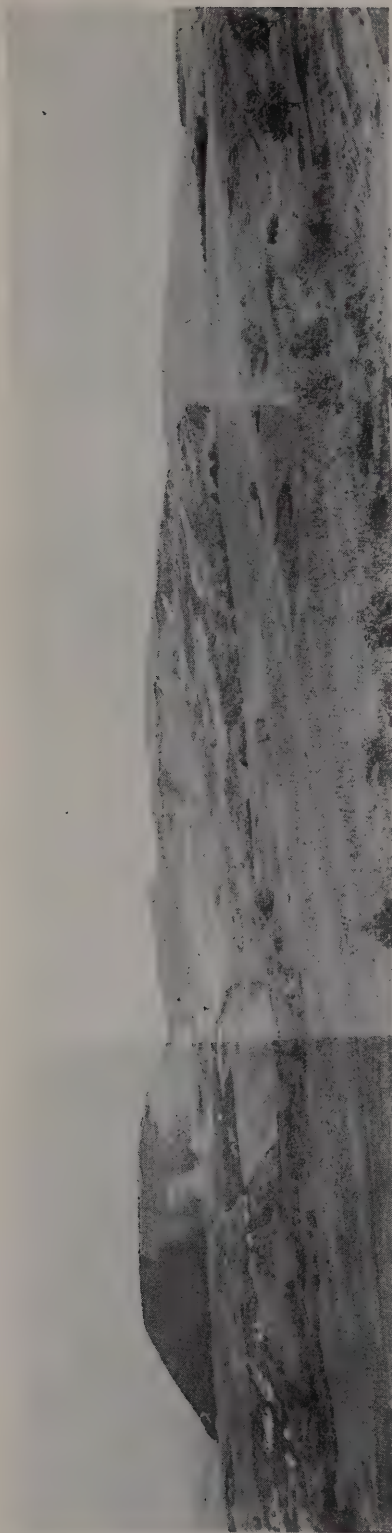


Plate XXIII *Porolissum*. The volcanic neck of *Dealul Magura* (left), taken from area of scatter of hydrothermal products on *Dealul cu Cremenei*. (Northern Transylvania.)

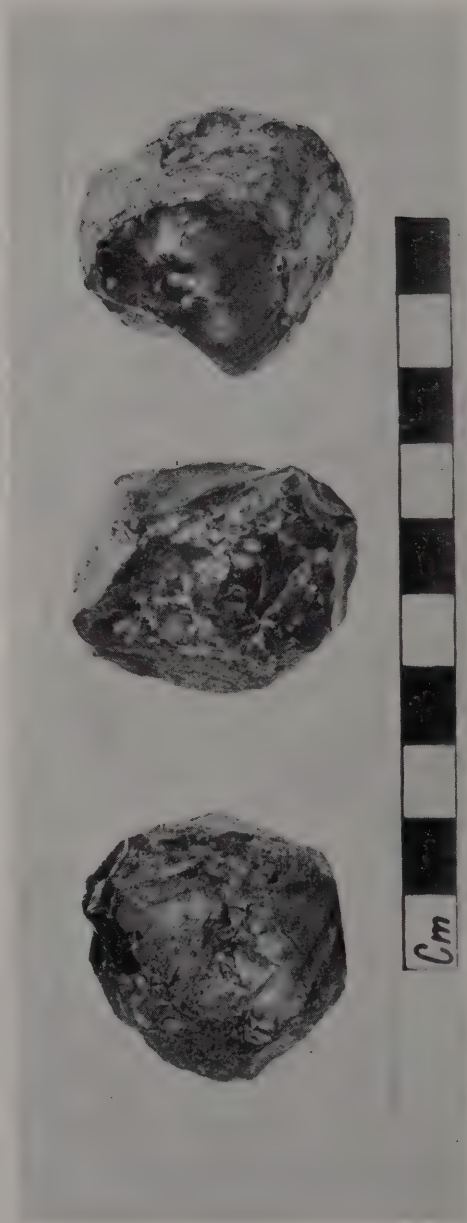


Plate XXIV *Baskó-Legelő*. (Zempléni Mts. See Plate 4). Specimens from a hoard of small obsidian bombs from a Bükk and Tiszadob site, to illustrate the size thought worth collecting by early man for purposes of working.



Plate XXV *Lelesti-Ciceu* (Northern Transylvania). Tuff outcrop (centre skyline) with black inclusions wrongly claimed as obsidian.

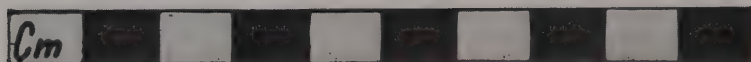
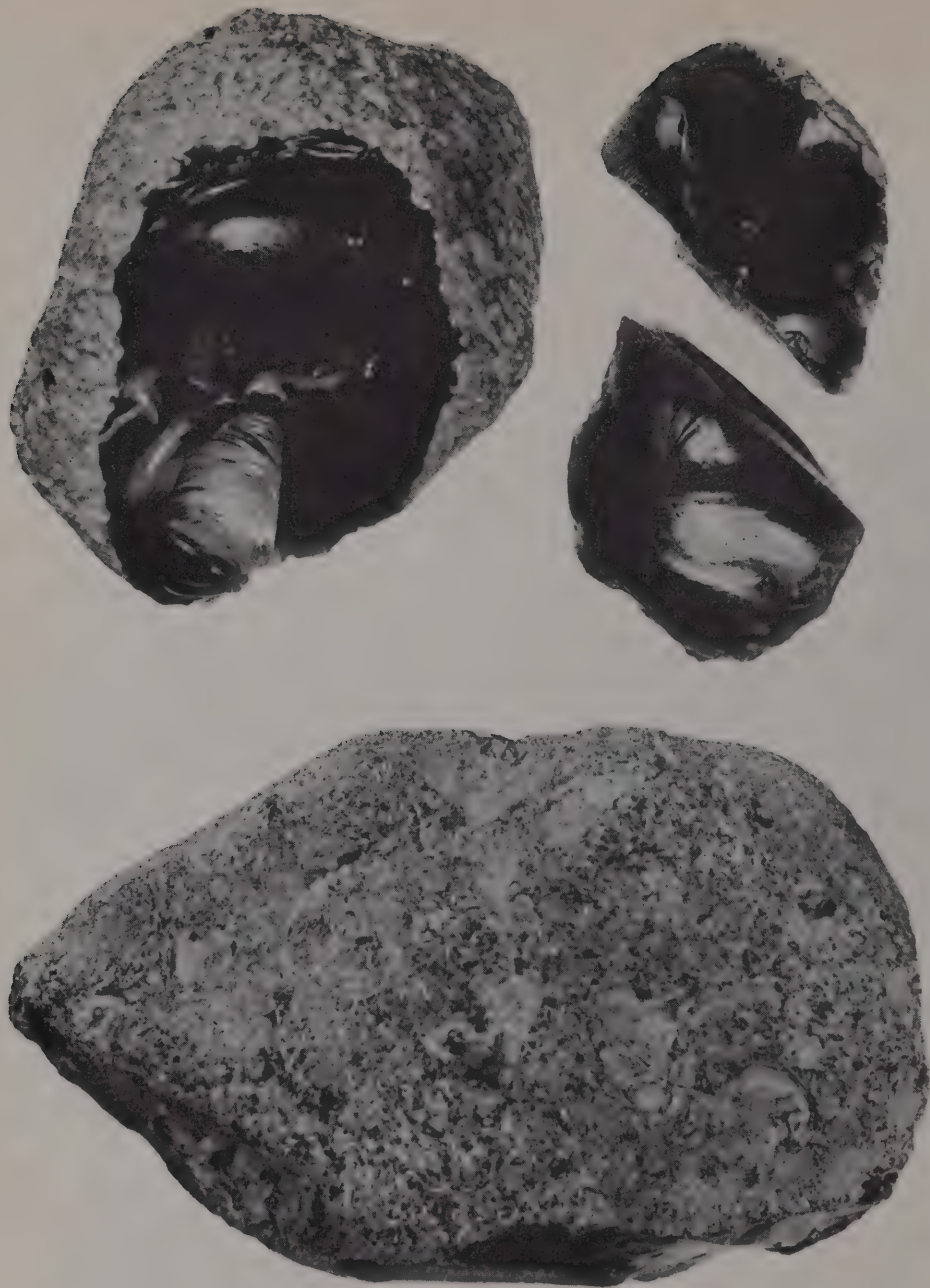


Plate XXVI Erdőhorvát—Szelek fej. (Zempléni Mts.). Specimens from a hoard of obsidian bombs from a Bükk site, showing pitted surface (upper) and small curved fissures (below) on cortex. The lower bomb is the specimen weighing 516 grammes. The largest specimen weighed 1007 grammes. (See text for size ranges).



Plate XXVII Baskó-Legelő (Zempléni Mts) Bükk (Tiszadob) site cut by gully with figures (see Pl. 7).

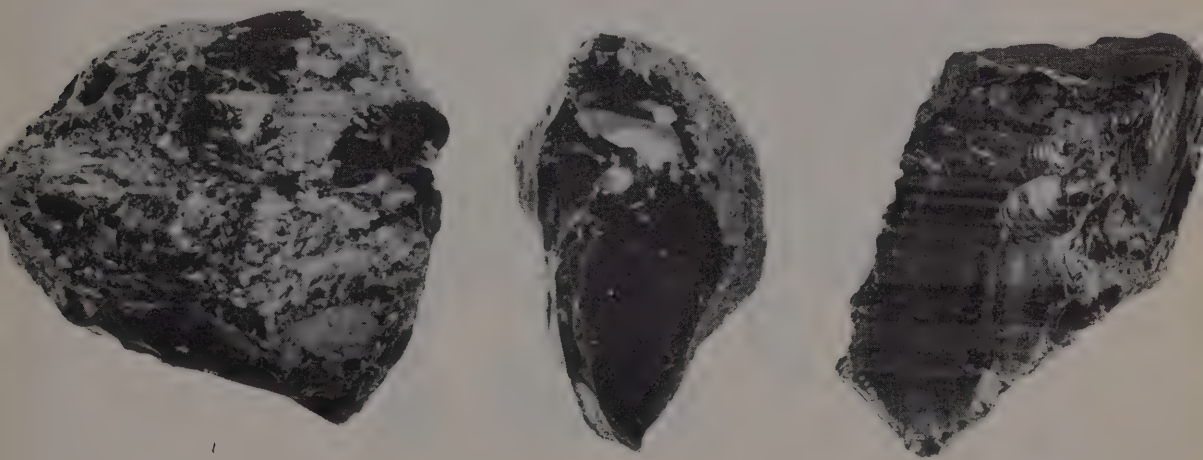


Plate XXVIII Erdőbénye—Liget major. (Zempléni Mts.) Geological source of obsidian. Hand samples of unworked obsidian bombs of suitable size for blade production. Banded and homogenous obsidian both present.

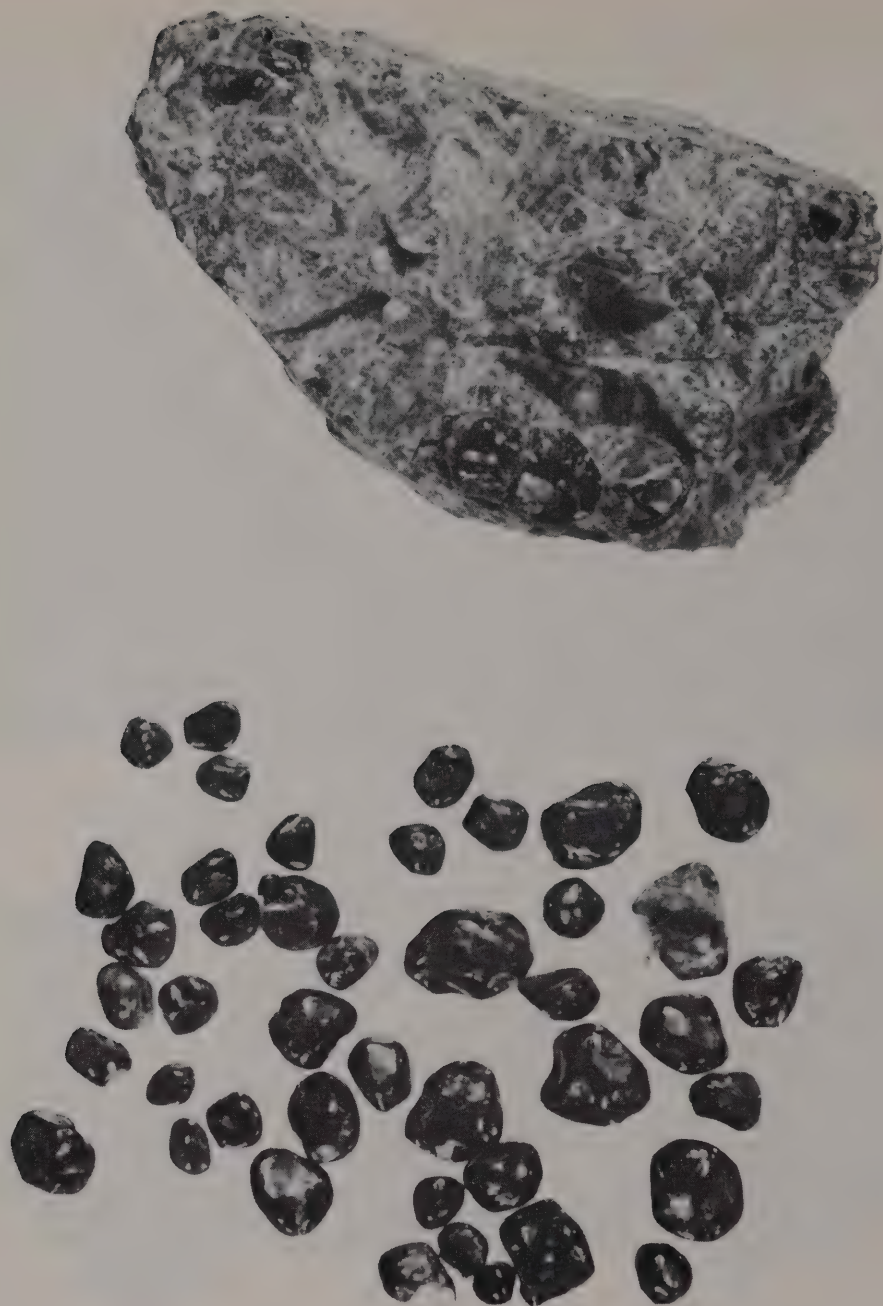


Plate XXIX Bodrogkeresztúr, Lebűj-kanjar. Enlargement of grey-green matrix showing obsidian pellets *in situ* (upper) in perlite, and freed of matrix (below), both to same scale.



Plate XXX Mount Harghita—Opálbarlang. (Eastern Transylvania). Geological hand samples of black opalates resembling obsidian, and probably ultimately responsible for the claims for obsidian from this area.

Patterns of Burial Orientation in the Round Barrows of East Yorkshire

by ALEXANDRA TUCKWELL

Introduction

This paper represents a contracted version of a thesis presented for part of the degree of M.A. with Honours at the University of Edinburgh (Tuckwell, 1970). The intervening period since it was written has seen the publication of Clarke's extensive work on the Beaker pottery of Great Britain (1970) and Lanting and van der Waals' reaction to and development of that thesis (1972). Both works, in their assessment of the Beaker element within Late Neolithic/Early Bronze Age Britain, have helped elaborate major aspects of my original dissertation while making its publication necessary to clarify the burial statistics quoted (Clarke, 1970: 257, 445-6; Lanting and van der Waals, 1972: 40) and to relate them to the variety of burial patterns discernible in parts of Britain during this period.

The aim of the original study was to reveal the existence of any discernible patterns of burial arrangement amongst the crouched inhumations beneath round barrows within Britain. This demanded a thorough examination of all possible ritualised aspects of skeletal arrangement and consequently required a large body of material which could provide a meaningful sample. Areas of Britain for which adequate burial evidence is available during this period are few. The major exception is East Yorkshire where the dual circumstance of the preponderance of inhumation over cremation until well into the Bronze Age (Simpson, 1968: 202) and comparatively skilled nineteenth century barrow excavation has provided us with a wealth of surviving evidence. It was therefore decided to restrict the basic analysis to this area, with the added advantage that patterns might be more readily discernible within a single geographic unit.

The two major nineteenth century archaeologists upon whose work this study was based are J. R. Mortimer (1905) and Canon W. Greenwell (1877, 1890), two antiquarians superior to the greater number of their contemporaries in their methods of excavation and their ability to record their findings as fully as was then thought possible. Their reports include extensive, if somewhat haphazard, details of barrow type and construction, burial ritual, skeletons and their deposition and a wide assemblage of grave goods. However, their methods of sexing the skeletons and of determining their orientation are not fully apparent and some element of doubt as to their accuracy is thus

inevitable. Added to this are such frustrations as result from referring to a Mortimer barrow plan for orientation details only to find that South is written at the top, North at the bottom, West to the left and East to the right! (1905: 222, Fig. 569). Nevertheless, Mortimer and Greenwell do provide a mass of information which can be profitably utilised as long as reservations are kept in mind; it is hoped that this paper will show that the very bulk of the information has meant the evening out of many discrepancies within.

Working in mutually exclusive areas, Mortimer and Greenwell excavated some 500 barrows covering East Yorkshire. It is important to recognise that each of these barrows did not cover a "single burial" in the accepted sense of that term, that is one solitary burial. The change from long to round barrows over burials is not coincident with a change from a multiple to single burial rite, even if it is indicative of some degree of cultural alteration. The reports of the Yorkshire round barrow excavations reveal that numbers of crouched inhumations can be found beneath the same barrow, whether in graves, on the old land surface or in the body of the mound. These inhumations are often accompanied, rather than disturbed, by cremations and quite often demonstrate, in a manner clear even to our nineteenth century antiquarians, some close contemporaneity of deposition. The probability of seeing some degree of continuous use, in the multiple burial tradition, of these round barrows is consequently demonstrable (Petersen, 1972: 37-40). Its significance for the present study lies in the individual stratigraphies produced within barrows which suggested categories for an initial grouping of the burials and in the possibility presented for discerning transmission of patterns of orientation through successive generations or groups. The range of associated grave goods suggests, on the present scanty radiocarbon evidence, chronological brackets for the burials in question of at least six hundred years. We are therefore considering evidence from a not inconsiderable period of time and amongst it patterns of orientation, if such existed, would hopefully become evident, in spite of the cultural amalgamation which must have taken place.

Method

From the original reports, information on 636 burials was extracted for analysis, discounting those burials where skeletal evidence was non-existent or where the skeletal arrangement had been definitely disturbed. The burials were assessed in terms of twelve basic factors (Fig. 1) covered by seventy-six variables. When each burial had been plotted according to these variables it could be expressed as twelve code-numbers which allowed rapid comparison between burials. The more critical information, from the point of view of this paper, could also be expressed in shorter letter-code form (as used below and in appendices). The variables for age of the skeleton were expressed according to the criteria of Mortimer and Greenwell but the lack of precision of their information and resultant lack of meaningful role in analysis suggests that the categories "adult" and "sub-adult" (Petersen, 1972: 30) would have been sufficient. The legs were treated as a single feature since information for them, unlike for arms, was seldom given separately. For burials with more than one associated grave good other than pottery a double or appropriate multiple

PATTERNS OF BURIAL ORIENTATION IN THE ROUND BARROWS OF EAST YORKSHIRE

FEATURE		Side positioning					Orientation					Line of sight												
VARIABLE NUMBER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
DESCRIPTION	Unknown	Left	Right	Back	Back Left	Back Right	Unknown	North	North-East	East	South-East	South	South-West	West	North-West	Unknown	North	North-East	East	South-East	South	South-West	West	North-West
LETTER CODE OR SYMBOL	—	L	R	B	B/L	B/R	—	N	NE	E	SE	S	SW	W	NW	—	N	NE	E	SE	S	SW	W	NW
NUMERICAL CODE	0	1	2	3	4	5	0	1	2	3	4	5	6	7	8	0	1	2	3	4	5	6	7	8

Sex	Age	Left arm position			Right arm position			Leg position			Position of associated pottery																		
		25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52
Unknown	Female				Unknown	Old (55 yrs +)	Young (12-30 yrs)	Adult (30-55 yrs)	Unknown	acute angle	right angle	oblique angle	Unknown	Unknown	right angle	acute angle	oblique angle	right angle	right angle	oblique angle	Not present	by face	by hands	by knees	by feet	behind legs	behind pelvis	behind back	behind head
—	M	F	—	C	Y	A	O	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
0	1	2	0	1	2	3	4	0	1	2	3	0	1	2	3	0	1	2	3	0	1	2	3	4	5	6	7	8	

Position of other grave goods					Position of accompanying cremation					Position of accompanying inhumation					FEATURE										
VARIABLE NUMBER	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	VARIABLE NUMBER	DESCRIPTION
Not present	by face	by hands	by knees	by feet	behind legs	behind pelvis	behind back	behind head	Not present	by face	by hands	by knees	by feet	behind legs	behind pelvis	behind back	behind head	Not present	at head	opposite	at feet	behind			
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
0	1	2	3	4	5	6	7	8	0	1	2	3	4	5	6	7	8	0	1	2	3	4			
	LETTER CODE OR SYMBOL																								
	NUMERICAL CODE																								

Figure 1. Coding of burial features.

number could be employed for feature 10. After the initial plotting, the coded burials were grouped according to their position within the barrow. Ten categories were differentiated in descending order of "purity", this being measured by the amount of reliance which could be placed on the burials not having been affected by subsequent depositions, barrow disruption or any other factor. Consequently the first category was constituted by single burials in the sole grave beneath a barrow. Primary burials in central graves, primary burials in graves other than central and single burials on the old land surface formed the following three categories. Category five comprised single burials within the fill of graves; these were possibly contemporary with the primary deposition or possibly secondary but by a small chronological margin. As a sub-group of this, a sixth category existed which contained the small number of burials recognised by Mortimer or Greenwell to be definitely intrusive in the grave fill. A seventh group, those burials inserted into the body of the mound, could be distinguished. The final three categories covered double burials within graves, double burials at the base of the mound and multiple burials.

Even before analysis of the available data for these groupings was undertaken, they were recognised as being to some extent arbitrary, since individual cases of similar stratigraphical position within separate barrows need not necessarily be chronologically or otherwise linked. The secondary burial placed in the body of one mound might easily be contemporary with the primary burial beneath a new mound being thrown up elsewhere. Consequently, the burials were examined in further groupings independent of their position in the mound but dictated by the two main cultural associations, Beaker and Food Vessel pottery, and by a number of subsidiary associations, among them jet beads, bronze awls and daggers and plano-convex flint knives, the only associated flint type which could be placed in a specific cultural setting (Clark, 1932).

It was hoped that if any patterns existed on any sort of chronological or cultural horizon then a differentiation of Beaker and Food Vessel burials might reveal them since, with very few exceptions, Beakers appear stratigraphically earlier than Food Vessels in the Yorkshire barrows and, on a wider front, Beaker pottery gave the initiative for change amongst the later Neolithic cultures in Britain, that change which resulted ultimately in Food Vessel production.

One of the approaches employed in the examination of material for the original dissertation which provides the basis of this paper was a sorting by computer on a single-link cluster analysis programme. This was used on a sample of burials selected, on a basis of association with relatively datable grave goods, from the first three categories of burials, all within graves, mentioned above. The computer sorting served to give a visual rendition in the form of a dendrogram of the patterns which emerged from the other forms of analyses employed. It is not reproduced in this paper but full details of the programme and its results exist in the original thesis (Tuckwell, 1970: 26-31, 67-68. Fig. 9).

Analysis

The original thesis on which this paper is based was entitled "Possible significances of orientation and positioning of skeletons..." but during the initial plotting of the grave features it became apparent that the information for limb positions was often too imprecise to allow any meaningful analysis to be made of positioning or was simply non-existent. Greenwell uses a single formula for leg position: "the knees drawn up more or less towards the face" (1877: 137) and even Mortimer, who usually offers more detailed information, occasionally makes use of a blanket "knees drawn up" term. Elements of positioning therefore, though where possible plotted as part of the burial code and analysed accordingly, produced no reliable results. The only significant trend which could be distinguished from the scanty evidence was a correlation in the degree of contraction of each set of limbs, i.e. if the arms were tightly bent so that the hands lay in front of the face invariably the legs were fully contracted with the knees right up to the chin. Full statistics, such as they are, exist in the original thesis (Tuckwell, 1970: 32-44). Until evidence from modern excavation permits a more refined analysis of limb positioning, it is not possible to extract such information as, for example, the chronological aspect of degrees of contraction which has been possible on the Continent (Bognár-Kutzián, 1963: 359).

The orientation of the skeleton and its related aspects appeared to interest nineteenth antiquarians far more than did body positioning. Consequently they supplied fuller, more precise information on these aspects, providing the data for the more meaningful analysis which forms the basis of this paper.

An examination of the total 636 burials showed (Fig. 2a) a major tendency towards orientation to the East and West, registering 23.8% and 20.5% respectively. Orientation on a North-South axis was substantially less, but was present. Analysis of the burials broken down into the ten categories described above showed no substantial deviation from these basic orientation trends, although some groups displayed a greater or lesser bias towards individual directions, in particular towards the East, while the "intrusive" category contained a markedly higher percentage orientated to the North than was noted in the general statistics. This compares with earlier assumptions (Thurnam, 1871: 321), based primarily on evidence from Wessex, that North was the primary orientation for burials of the British Bronze Age. This will be discussed further below. Of the statistics for direction faced or line of sight (Fig. 2b) it will be noted that some 30% face directly South, 15% East and 12% North. This again was reflected in the separate groupings, with South always the most popular direction, and this especially so in the double and multiple burial categories. The only deviation was in the relative popularity of the second direction faced, North predominating over East in the categories of single burials in central graves, on the old land surface and within grave shafts. Figure 2c demonstrates the statistics for those burials placed wholly or partially on their sides. A total of 322 out of the 636 burials were placed on their right. Compare this with Thurnam's contention (1871: 319), which eventually came to be widely accepted, that the "normal" Bronze Age practice was to place the body on the left side. Again, the analysis of the individual

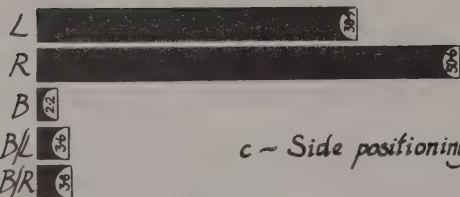
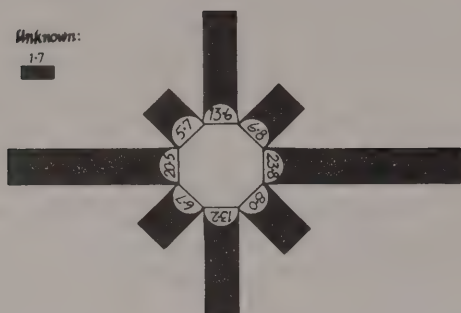
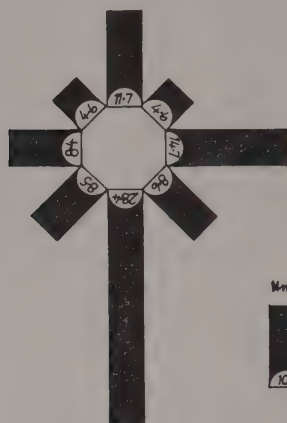
a ~ Orientation*c ~ Side positioning**b ~ Line of sight*

Figure 2. Burial statistics for total sample (as percentages).

groups showed no disagreement with, or marked departure from, the overall statistics. One category was notable however in containing a large percentage, nearly 20%, recorded as having been placed partially on their backs. This category was that for burials within the grave-fill and this leads to the conclusion that these inhumations were deposited at the same time as the primary interment and grave-filling and that the subsequent sinkage of the bones with the fill material caused the skeletal position to alter. This would tend to support the possibility of contemporaneity of a number of the original groupings and the general agreement of the statistics of these, in particular of groups two, three and five, in the initial analysis is consequently to be expected.

It has been stated above that the arbitrary nature of the ten categories was recognised at an early stage and that analysis of further groups formed on the basis of more reliable cultural associations was subsequently undertaken in an attempt to isolate traits observed in the general analysis. The first group to be examined on the basis of these specific criteria comprised burials with Beakers. The statistics, (Fig. 3a and b) indicating some 83% orientated on a more or less East-West axis and over 80% facing in a Southerly direction, demonstrate that at least part of the predominance of this form of burial arrangement in the total burial statistics must be attributed to Beaker influence. This pattern has since been noted by Lanting and van der Waals (1972: 40) who recognised the combination of Left side placing with Eastern orientation and Right side placing with Western orientation which resulted in the majority of burials facing South. They were

PATTERNS OF BURIAL ORIENTATION IN THE ROUND BARROWS OF EAST YORKSHIRE

forced by lack of information to use accompanying grave goods as indicators of the sex of the burials; from this they concluded that male burials accounted for the easterly orientated element then assumed female burials to be represented by Westward orientated skeletons. The criterion of associated grave goods on which this is based has been proved to be rather a shaky one (Gallay, 1972), and even Greenwell rejected it in favour of sexing by other criteria (1877: 218). However an examination of those burials where the sex is stated (Fig. 3c and d) shows that in this case the conjecture can be borne out. The sexual differentiation is furthermore clear enough to indicate that in those cases where the sex is unknown probability suggests agreement with the features of the sexed burials. The pattern for the Yorkshire Beakers can therefore be stated as one of males placed on their left orientated East and looking South, the LESM burial, and females placed on their right, orientated West and also looking South, the RWSF burial. These abbreviations and their equivalents will be utilised for the rest of this paper. As can be seen (Fig. 3c and d) not all Beaker burials were deposited in exact accordance with this pattern. Those which deviated in orientation by 45° or less and were facing into the Southern quadrant, i.e. between South East and South West, were taken to represent the same tradition. Some burials however, in particular the six orientated North, differed to such a marked degree as to suggest a separate element or rapid devolution of pattern. An attempt to elucidate this, by use of the Lanting and van der Waals system for Beaker chronology, is discussed below.

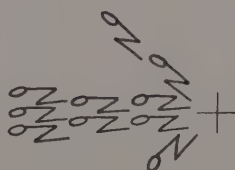
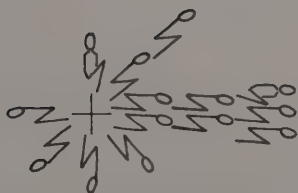
a - Orientation



b - Line of sight



— : one burial



c - Male burials

d - Female burials

Figure 3. Beaker burial statistics.

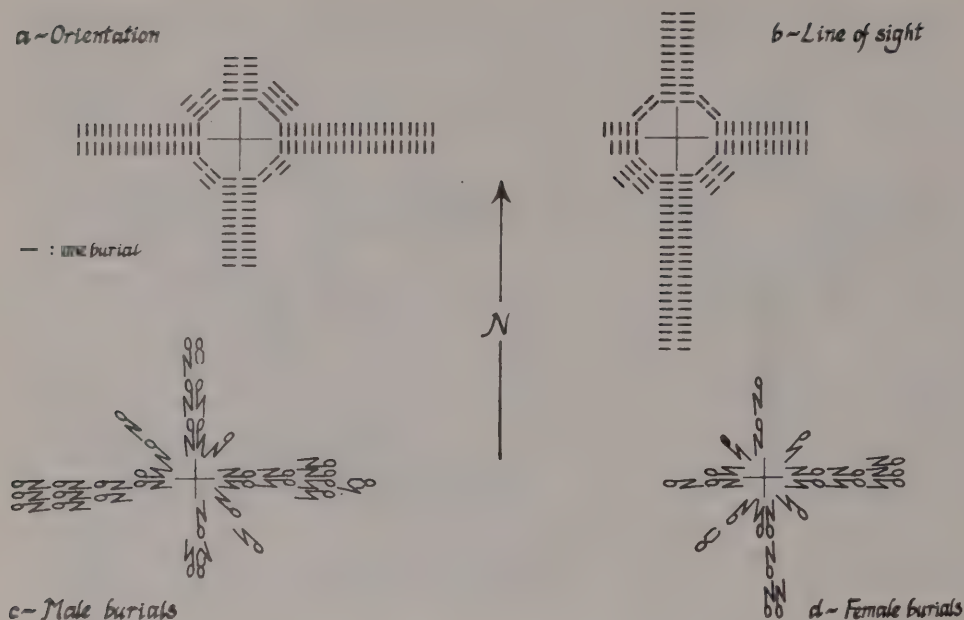


Figure 4. Food Vessel burial statistics.

Examination of the Food Vessel burial evidence provided a far less clear picture than did that of the Beakers (Fig. 4a and b). The major orientations to East and West are not so distinct, and a large proportion now point North. The line of sight is still predominantly to the South but it is by no means exclusive and a high number of burials now look to the East and North. Analysis of burials of known sex shows a major contrast with Beaker burials (Fig. 4c and d). Male burials on their right far outweigh those on their left, and in addition there is a group of female skeletons placed on their left contrasting with those laid on their right. We appear to have therefore some degree of reversal of the Beaker pattern, although this is represented in its pure form by six LESM burials (out of ten known males on their left) and three RWSF (out of a total of thirteen known females). As well as the reversal of this pattern, represented by the eleven RWSM and five LESF related burials, the statistics include a sizeable number facing North, of which the majority, both male and female, are placed on their right and orientated East. It is therefore clear that it is not possible to assume, as one safely could with Beaker burials, to which pattern the un-sexed Food Vessel burials are to be ascribed.

In an attempt to isolate specific traits within the wider Food Vessel burial range, burials associated with further categories of grave goods were examined. Plano-convex knives have been demonstrated to be essentially culturally linked to the Food Vessel tradition (Clark, 1932: 160) and amongst the burials in question, of those of known sex associated with these knives, six were male and only one female, suggesting a male

predominance amongst the other unknown skeletons (Fig. 5a). If this is so then burials with plano-convex knives show the same pattern trends in general as Food Vessel burials, with quite high numbers of RWS male burials but with still a strong LES element. They are rarely orientated or faced towards the North, unlike some sections of the Food Vessel burials however, and do tend to indicate, in their overall predominance of Southward facing skeletons, that they represent one segment of the wider Food Vessel cultural milieu whose burial practice, in spite of its lack of side differentiation, falls closest to that of the Beaker-using communities.

The bronze work found with the East Yorkshire skeletons covers a wider range of associations than do the plano-convex knives. The main types which occur are awls and daggers, the latter ranging from tanged and single rivetted to omega hafted and multi-rivetted. The burial information (Fig. 5b) shows a range of skeletal arrangements associated with awls. With one exception, all of the burials of known sex are female, strongly suggesting that the remainder of unknown sex are most probably predominantly women. Those burials where the association is both with an awl and a Beaker would appear to follow the usual female pattern being RWS and R SW SE whilst those where the awl is in association with a Food Vessel have mostly a Northward facing aspect. This tends to suggest that the pottery rather than the awl association is the governing one for the determination of the deposition pattern. At Butterwick XXXIX (Greenwell, 1977: 186-7), the one definite association of an awl with a male inhumation, the skeleton is deposited according to the Beaker pattern. The awl is accompanied however by other bronze implements mentioned below, the cultural associations of which could alternatively have dictated the method of deposition. In the case of the awl from Life Hill 294 (Mortimer, 1905: 204) which accompanied a cremation closely associated with an LESM burial partly on its back, a complex overlap of a number of features of burial tradition can be observed.

Dagger burials display a far more unified pattern (Fig. 5c) with nine out of twelve being LES burials. All the stated sexes of the skeletons are male, subject to the reservation that the sexing might have been decided on the basis of the dagger alone. Greenwell almost certainly assumed femininity in cases of burials of "slight adults" with children (1877: 309) and may have used similar emotional criteria for males, but on the basis of the general evidence, produced independently by him and Mortimer, where their sexings agree to a remarkable degree, the skeletal evidence can be taken to be in the main accurate. Again, greater reliance can be placed on their accuracy on account of those burials, some associated with daggers and other apparently sexually diagnostic objects, for which they did not give the sex. If their criteria had been of a superficial nature they would have applied them far more easily and ubiquitously. Accepting the sexing of the dagger burials, therefore, we have what appears to be a clear Beaker pattern. It was to be expected that tanged and single-rivetted daggers, whose origins have been shown to lie with the Beaker assemblage (Piggott, 1963: 73; Clarke, 1970: 170), would accompany burials of the basic Beaker type. The appearance of this same pattern, however, amongst burials associated with typologically developed daggers suggests the retention of a burial

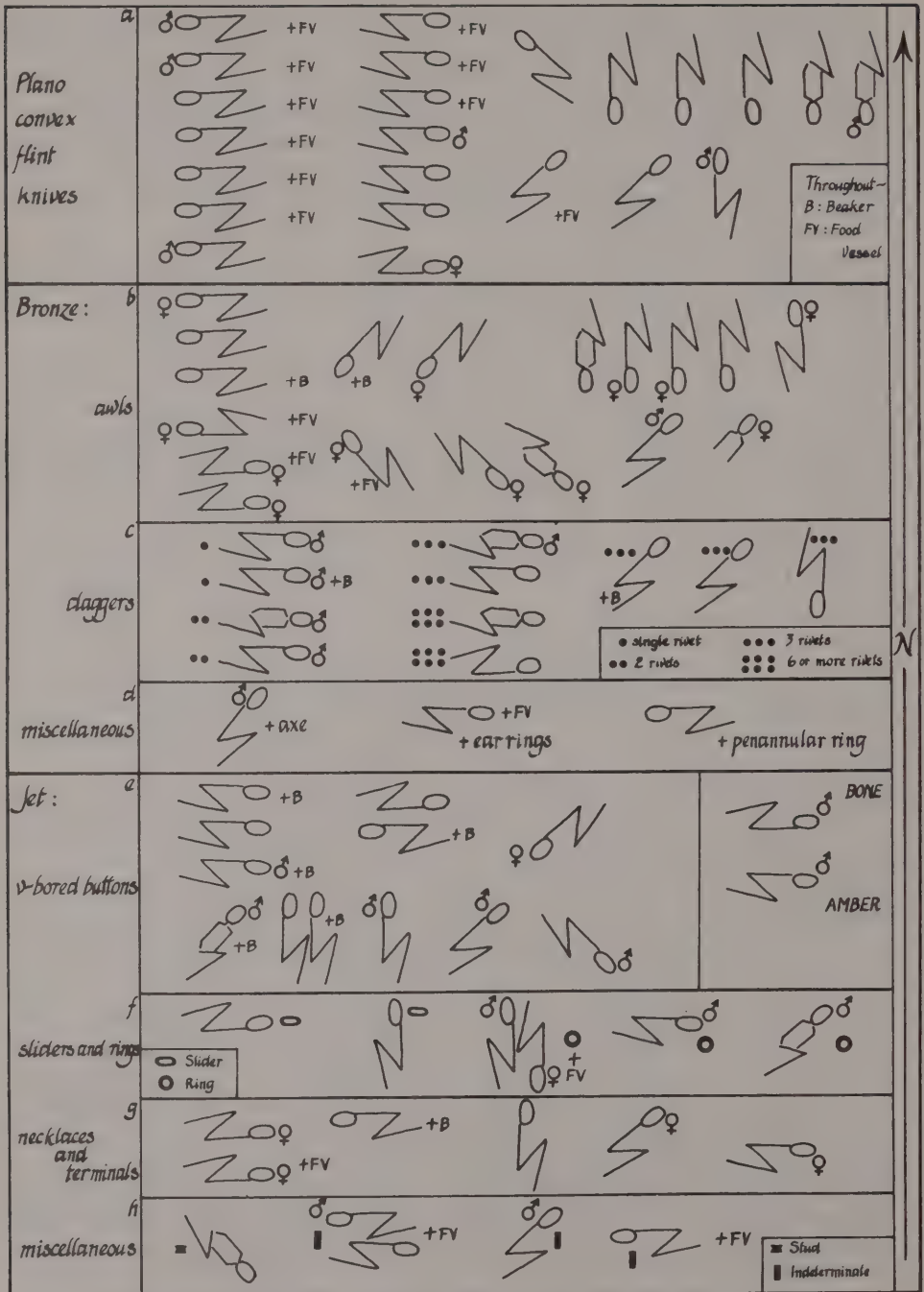


Figure 5. Burial patterns for plano-convex knives, jet and bronze associations.

tradition beyond the period of its initial introduction as part of a culture which included the original metal-working impetus. The skeletons from dagger graves which do deviate from the Beaker pattern are represented by an LSW burial with omega-hafted dagger at Garrowby Wold 32 (Mortimer, 1905: 146) and a male REN burial with the Towthorpe 233 example (Mortimer, 1905: 7) which had a developed mid-rib and six rivets. Both of these daggers include elements out-with the early Beaker metal-working tradition and demonstrate continued links with Continental metallurgical traditions and their concurrent cultural influences.

Of the burials associated with jet buttons, eight are accompanied by Beakers and one by a Food Vessel. Those with Beakers adhere more or less to the normal pattern (Fig. 5e) with the three notable exceptions which are orientated North. It is interesting that these three represent 50% of the total number of Beaker burials orientated North; of the non-Beaker associated burials with buttons, Northern orientation and line of sight is quite prominent. Northerly orientation does appear to be linked to a larger series of buttons, which can be placed quite early in the jet button tradition (Shepherd, 1973: 44). The one bone V-perforated button association is of a male on his right, facing North. The two buttons associated with the earlier Beakers of Step 4 comprise those of amber (Mortimer, 1905: 274) associated with a pure LESM burial and one of jet (Mortimer, 1905: 101) which is one of the three with a Northern orientation. Since burials with Step 4 Beakers all otherwise follow the Beaker pattern very closely (see below) it must be assumed that some element of the jet-using population lay outside the Beaker cultural sphere, certainly as far as burial tradition was concerned. In this connection it can be noted that the one button association with a Food Vessel was with an REN female burial.

Burials with other jet types represent a collection of patterns. Necklaces and necklace terminals, often mistakenly termed "triangular pendants" in the original literature, occur, with only one exception with female burials. These range in pattern (Fig. 5g) from one example of the classic Beaker RWS to the reversed positioning of LES. The only pot type in association is a Food Vessel with one of the two RENF burials. It is this association, together with the mixed method of deposition which, in its range of orientations and inclusion of females buried on their left, resembles the observed Food Vessel practices, which points to a link between necklace bearing females and that section of the society whose main cultural type was the Food Vessel. The evidence from burials with jet rings, links and miscellaneous pieces (Fig. 5f and h) is again rather mixed, including Food Vessel associated burials of reversed Beaker pattern and some degree of Northerly orientation and line of sight which characterised some of the jet associated burials above.

One further cultural association which, in spite of the paucity of accompanying burial evidence, should be considered is the barbed and tanged arrowhead. It has been demonstrated to be part of the Beaker assemblage (Piggott, 1963: 67; Clarke, 1970: 263) but the examples from the present data, on the basis of the burial evidence, show little agreement with this. One is associated with a Food Vessel at Rudstone LVIII (Greenwell, 1877: 248-9) and accompanies an RWS burial; the example at Helperthorpe XLI (Greenwell, 1877: 191) is associated with a double burial, both skeletons being on their

right looking East and the arrowhead from Hanging Grimston 9 (Mortimer, 1905: 106) accompanied a burial of which only the details that the skeleton was partly on its back, partly on its right were included. The agreement of the burial pattern of non-Beaker associated arrowheads with the observed Beaker one is therefore not certain.

The examination of the above groups of evidence has been to the end of determining firstly, how much other cultural associations accounted for patterns already described in connection with Beaker and Food Vessel burials and secondly, whether these provided cultural criteria which altered the nature of the patterns in question. Two further groups of evidence, that from barrows containing both Beaker and Food Vessel burials and that from double and multiple burials present interesting data on the problem of whether or not adherence to a traditional pattern was of prime cultural importance in the burial ritual. The examination of those burials associated with Beaker and Food Vessel deposition and contained within the same barrow shows an interesting agreement of orientation pattern. At Folkton CCXLII (Greenwell, 1890: 10-12) a Step 7 Beaker and a Food Vessel are both deposited with LES burials, both sexes unknown but the Beaker presumed male. The Ganton XXI barrow (Greenwell, 1877: 161) contains three Food Vessels deposited with LESM burials and one with an R SW SE F burial together with two Step 6 Beakers, one with an LESM burial, the other an LES, presumed male. Where the Beaker burials do not follow the pure LESM-RWSF pattern, the subsequent Food Vessel burials diverge from it also. Thus at Garrowby Wold 104 (Mortimer, 1905: 134) where the Beaker burial is an RSE male a secondary Food Vessel burial is an R SW SE, sex unknown. The Beaker with an RSW male burial from Garton Slack 74 (Mortimer, 1905: 221) is followed by a Food Vessel RENF burial and at Acklam Wold 204 (Mortimer, 1905: 86) the barrow contains an RNW burial with a Beaker and an REN positioned skeleton with a Food Vessel. Only at two barrows is the agreement not exactly clear. At Painsthorpe Wold 4 (Mortimer, 1905: 113) an L SW NW male burial with a Step 5 Beaker and an RWSF burial with a Step 6 example are found in the same barrow as an FP Beaker burial where the skeleton is L SE SW and a Food Vessel burial also L SE SW. At Rudstone LXVII an AOC Beaker accompanies a female burial placed according to the usual pattern R NW SW (the only AOC Beaker to follow this pattern: see below) while the three Food Vessels accompany burials of RWSM, RNWF and RSEF type. It is to be noted that the above-mentioned examples of Beakers not conforming to the general pattern represent over a third of the total numbers known. With regard to the stratigraphical position of Food Vessel burials, the deposition pattern of the skeletons in Barrow 205 at Acklam Wold (Mortimer, 1905: 87) is of some interest. Here a Food Vessel burial, RWS but sex unknown, was cut into a barrow containing five previous interments all on their left, one partially on its back, all facing South to South East and including two males and one possible female. There are no diagnostic associations with these previous burials but their adherence, with the exception of one possible rogue female burial, to the overall Beaker pattern is striking.

The evidence of Beaker associated double burials demonstrates (Fig. 6a) that, in contrast to the opinion of Lanting and van der Waals (1972: 40), they adhere even more

PATTERN OF BURIAL ORIENTATION IN THE ROUND BARROWS OF EAST YORKSHIRE

Type	Shadow 	Mirror 	Toe to toe 	Head to toe: 1 	Head to toe: 2 	Angled
Beaker 						
Food Vessel 						
Others 						

Figure 6. Double burial patterns.

firmly to the pattern than do some single burials. There are only three sets of skeletons in which the pairs can be judged to be of the same sex, and all three are placed according to the "shadow" position (Tuckwell, 1970: 51-2). For those double burials where the sexes of the skeletons differ, the "head to toe" position, which enables both skeletons to face in the same direction, and the "toe to toe" position are employed. In short, the placements adhere to those demanded, according to the tradition, by the individuals' sex and are not apparently altered in favour of any criteria that might express relationship or social position. Due to the unreliability of relating unsexed Food Vessel burials to a specific pattern, the effect of double burials upon the deposition ritual employed is more difficult to assess. It can be seen (Fig. 6b) that pairs of skeletons of the same sex are found buried in combinations LESM and RWSM, such a complete departure from the Beaker norm that it suggests side differentiation is of little importance at this stage. This interpretation is discussed below. For the three "shadow" burials associated with Food Vessels, the sex of the skeletons is unknown and there is no single popular line of sight, with two pairs looking East and the other South. "Toe to toe" and "head to head" burials were, unlike Beaker burials, of the same sex where it is known. Apart from these contrasts to the Beaker double burials there is the additional feature that Food Vessel pairs are not so clearly represented by the classic double burial types, with "mirror", "shadow" and other types not so precisely positioned. Of the twenty double burials without definite Beaker or Food Vessel associations, it can be seen (Fig.

6c) that 50% face each other, allowing the possibility that the direction faced in cases outside the Beaker sphere was governed by the association with another burial and not by an independent pattern.

The majority of multiple burials number between three and seven skeletons and are not "pure" multiple burials being for the most part combinations of double burials with single additions the contemporaneity of which is not certain. There are only two instances of true multiple burial; these are of thirteen skeletons at Garrowby Wold C69 (Mortimer, 1905: 138) and of ten at Calais Wold 275 (*ibid.* 1905: 161), the barrows situated about a mile and a half apart. The circumstances of the deposition of the two sets of skeletons is somewhat similar, both groups being laid out on a flat pavement of stones at the base of their respective mounds. The sexes and ages of most of the skeletons were indeterminate but the group in Garrowby Wold C69 appeared to be a combination of adults and children. There (Fig. 7), nine out of the thirteen faced South and the associations included two Food Vessels. At Calais Wold 275 only four out of the ten look to the South and it is difficult to assess whether the five opposite are intended to look North or to face their companions. From the double burial positioning analysis it would appear that, apart from cases of Beaker associated burials, either explanation is possible. Since the only culturally diagnostic association with either of the sets of burials is a Food Vessel the tendency towards a North-facing predominance amongst these burials is possibly to be expected.

The evidence set out above has been almost entirely about orientation and its accompanying factors. Before we go on to a final consideration of this main facet of the burial evidence, a résumé of the data for the positioning of accompanying grave goods in relation to the skeleton should be considered. The statistics for the positioning of Beakers within the Yorkshire graves do not agree with Clarke's analysis for his overall groupings (1970: 257). The division appears not to be between positions in front of and behind the

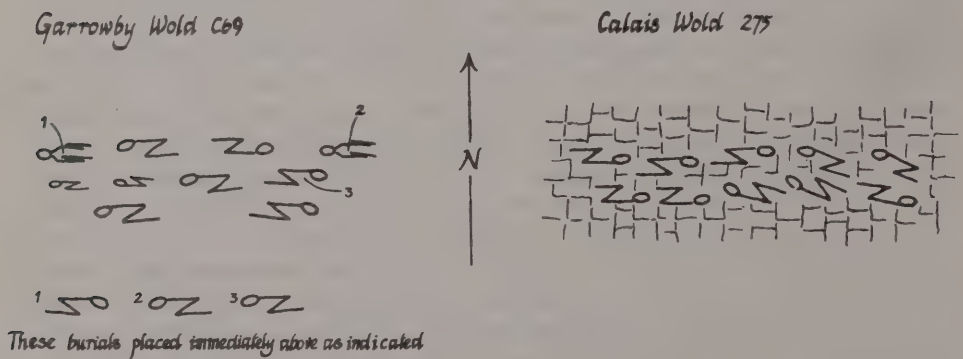


Figure 7. Multiple burials.

PATTERNS OF BURIAL ORIENTATION IN THE ROUND BARROWS OF EAST YORKSHIRE

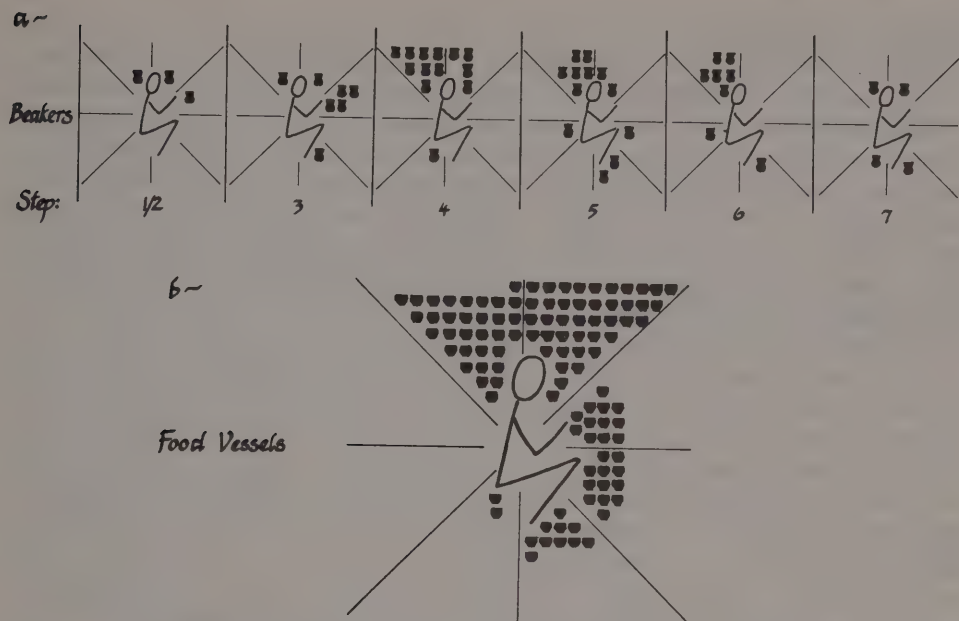


Figure 8. Positioning of pottery with Beaker and Food Vessel burials.

body but rather between placement at the head or at the feet (Fig. 8a). Nor does the comparative popularity in the use of these positions alter much chronologically, with the marked preference for the region of the head existing throughout all of Lanting and van der Waals' groupings. The three Step 1/2 examples are all placed in the upper region of the body and Steps 4 and 6 in particular exhibit a strong preference for the region of the head. As far as the evidence allows, no sexual differentiation in the positioning of the Beaker can be discerned. The preference for a position in the region of the head is even more marked amongst Food Vessel burials (Fig. 8b) with almost 60% of the pots placed in that area. The only major departure from the preferred Beaker areas of placement is by that number of Food Vessels positioned in the region of the knees. Again there is no apparent sexual differentiation of positioning but lack of any positive indication by pattern of the sex of those Food Vessel burials for which it is not given makes any decisions of this nature pure conjecture. Analysis of the positions of additional accompanying grave goods produced no more definitive patterns, the main positions being again in the region of the head and feet. Positions of the jet and other button associations were dictated by their original function and there was no apparent suggestion of clothing or similar objects having altered the body's positioning by restricting arm or leg arrangement or similar action. In short, there was little evidence to support the differentiation of groups on a basis of grave good position; if such criteria did exist they were too subtle to be detected. The patterns of orientation, side positioning and line of sight of the skeleton emerged as the only ones capable of suggesting cultural divisions.

Comparative evidence

Before we examine the evidence existing for the burials of this period beyond that of Mortimer and Greenwell for Yorkshire, we must first note the groupings of the Yorkshire Beaker burials according to the seven-step system of Lanting and van der Waals (Appendix I). It will be seen that there are only three examples for Steps 1/2 and that only one of these, that from Rudstone LXVII, an R NW SW female burial, is of the Beaker pattern. Only two Step 3 Beakers are associated with burials for which there is adequate information, one an LESM, the other an R NW SW F; this suggests that the pattern could have existed by this stage but the lack of Step 3 Beakers in Yorkshire makes the strength of its existence there impossible to assess. With Step 4 Beakers we can see the full emergence of the pure pattern with thirteen out of the sixteen burials for which there is adequate evidence being LESM/RWSF or within 45°. The majority of burials of Steps 5 and 6 continue to adhere to the pattern although a Step 5 Beaker is associated with an instance of a male buried on his right while a male on his left with a Step 6 Beaker is looking in a Westerly rather than a Southerly direction. Step 7 is represented by only four burials, two facing South according to the Yorkshire Beaker tradition and the others to East and West. Some degeneration of the pattern at what is a late stage in British Beaker development must to some extent be expected.

The source material for all the above data was drawn from the works of Mortimer and Greenwell alone; this was partly from choice in that restriction to two sources might help standardise the data and partly from circumstance in that few modern excavations have been published which have yielded adequate burial evidence. One exception is that of the Beaker cemetery at Staxton (Stead, 1957: 133) where five burials, three females and two males, were recorded. One male, an LES burial accompanied by a Step 5 Beaker, was placed in a pit cut into by that of a subsequent female burial, also LES. The other two female burials were the usual Beaker RWS but the second male was also RWS. All five therefore comply with the Beaker norm of facing South, while not adhering strictly to the sexual differentiation of position. The only reversal in sexual positioning noted for the burials from Mortimer and Greenwell was with a Step 5 Beaker and the further association of a Step 7 Beaker at Staxton suggests the disintegration of the pattern at this stage as has already been considered possible.

Reasons are given in the introduction to this paper for the restrictions of the scope of the original thesis to East Yorkshire, the superior quality of the excavation reports available for this area being chief among them. A look at the reports of barrows excavated in the adjacent county of Derbyshire by Bateman between 1848 and 1858 (Bateman, 1861) shows clearly the difficulty entailed in finding evidence of burial pattern for those areas outside Yorkshire. The full details necessary for an assessment of the possible existence of a deposition pattern are seldom given, all too often the side positioning alone of the skeleton is mentioned. This leaves one tempted to believe that those Beaker burials described as being males on their left (e.g. Bateman, 1861: 116) follow the Yorkshire pattern, especially since the rare examples where full evidence is given do comply (e.g. an LESM from Smerrill [Bateman, 1861: 103]). Further meagre burial evidence from other

main areas of Late Neolithic-Early Bronze Age occupation does suggest some tentative conclusions as to patterns in burial deposition outside Yorkshire, but only one area, comprising the North of England and adjacent areas of Scotland, can be seen to include burial patterns bearing resemblance to those recognised in Yorkshire. In Scotland, cists containing inhumations associated with Beakers are orientated East-West and North East-South West. (As with burials themselves, this 45° deviation most probably represents the same pattern.) The majority of male burials within adhere to the Beaker LES pattern (McAdam, 1974: 9) but there is less definite evidence for female burials, with only one recorded R SW SE F. Scanty data for the North of England, summarised by Lanting and van der Waals (1972: 41 fig. 4), includes RWSF and LES, presumably male, burials. A male burial from Castle Carrock, Cumberland, dug by Greenwell (1877: 379) was of the usual pattern on his left, looking South East. In addition, what is known of Food Vessel cist burials in Scotland (McAdam, 1974: 18-19) suggests that the Yorkshire admixture of patterns extends in this direction. Both males and females are found buried on right and left, elements of the Beaker pattern are retained but Northern orientation and Northern and Eastern line of sight are quite prevalent. What evidence is available for the Wessex area (Lanting and van der Waals, 1972: 37-8 fig. 1) points to a very different orientation pattern for Beaker burials there. Males are orientated to the Northern segment of the compass, placed on both left and right and consequently look to both East and West. Scanty evidence for females shows them apparently orientated in a Southerly direction, also placed on either side with their line of sight to both East and West. It appears that some pattern was in use of a less sharply divided nature than that of the Beakers to the North. It is of note that the Step 4 range of Beakers, with which the establishment of the Yorkshire pattern has been linked, is very little evident in Wessex (Lanting and van der Waals, 1972: 36).

The association of the introduction, in its purest form, of the Yorkshire Beaker burial pattern with Beakers of Lanting and van der Waals' Step 4, which includes a number of possibly insular developed examples, begs the question of whether the burial deposition pattern as we see it developed with the settled insular groups or was transmitted from Europe with the continued influence of peoples allied to the Beaker cultural tradition. The small numbers of Beakers of previous steps present in Yorkshire suggests the introduction of those comprising Step 4 from elsewhere, be it from Beaker communities further South or from the Continental homeland. Wessex, the one area where a continuous Beaker development from AOC onwards can be recognised (Lanting and van der Waals, 1972: 41-2) has a very different burial pattern and it is not likely that the Yorkshire Beaker pattern could have derived from there. On the assumption therefore that the tradition is more likely to have derived from the continental Beaker communities, evidence of possible relevant burial patterns there were examined.

The origins of Beaker traits within Europe are still an unsettled question and it would require more than a collection of present standpoints (Clarke, 1970; Treinen, 1970; Lanting and van der Waals, 1972; Harrison, 1974), which is all that the scope of the present paper would permit, to give an adequate background to the burial features under discussion. The probable areas of origin for some at least of the Beaker culture elements are not in

dispute, even if their relative importance and place in the evolutionary sequence is not certain. On the available evidence, the most likely cultural forebears of the Beaker groups practising the burial pattern that is found in East Yorkshire must derive from the Netherlands, the North and Middle Rhine extensions of the Central European Beaker culture areas. Little skeletal evidence for Beaker burials exists in the most immediate contact zone of the Netherlands where destruction by acid soils too often leaves only a "silhouette", capable only of proving a crouched inhumation tradition. This puts added reliance on the evidence of grave orientation, of earlier cultural patterns and of other areas of Beaker development. Dutch Beaker origins lie in the development from the Protruding Foot Beakers, the Westernmost extension of the East and Central European Corded Ware groups (Lanting and van der Waals, 1972: 45). PFB grave orientation is basically East-West (Lanting, Mook and van der Waals, 1973: 47) as is that for the Northerly single graves from Schleswig-Holstein (Struve, 1955: 70) and the graves of the over-grave period in Jutland (Glob, 1948: 160-1). Although where crouched inhumation is concerned, grave orientation does not necessarily reflect the orientation of burials within, in the case of PFB graves and burials the assumption of agreement of orientation is largely valid, with a detectable pattern of RWS and R SW SE males and LES and L NE SE females (Häusler, 1969: 159). This same pattern is found in Corded Ware graves throughout the territory of the culture, in South West and Central Germany (Häusler, 1969: 259), Bohemia (Buchvaldek and Koutecký, 1970: 190-3) and Moravia (Neustupný, 1961: 80), Wolhynia and Podolia (Häusler, 1963: 367) and the Sub Carpathian barrow graves (Sulimirski, 1968: 81). This pattern of orientation with the majority of burials looking south can be seen to be identical to the Yorkshire Beaker pattern in all but one major respect: the side on which the male and female burials are placed is reversed. The only evidence for males positioned on their left as in Yorkshire is for the Bell Beaker culture in Central Germany, in the Swedish Streitaxtkultur and in the Mitteldneprkultur (Häusler, 1969: 259). Of these the Central German Bell Beaker culture is of chief interest; the pattern there is of Northern and Southern orientation and Eastern line of sight (Fischer, 1956: 164) characteristic of some of the jet-associated burials noted from Yorkshire. Present investigation into Beaker burials elsewhere in Central Europe has revealed a basic North-South orientation also (Stephen Shennan, pers. comm.) with only occasional East-West orientation; no sexual information is available to elaborate the pattern. The LNE and corresponding RSE burials are found elsewhere in Europe in this period, in Klempen, in the Haffküstenkultur and in Meklenburg (Häusler, 1969: 259) but with the sexual side distinction of the German Bell Beaker burials reversed. Northern and Eastern orientation are taken to be an early feature of the Corded Ware burials further East (Sulimirski, 1968: 79). In the barrow graves of the Steppe border and in the flat cemeteries of the Dnieper culture it is coincident with burial on the back, that is in the classic Yamna or pit grave position. In the Netherlands, AOO and Maritime Beaker graves differ from earlier PFB orientation in being basically North-South (Lanting, Mook and van der Waals, 1973: 47) but the graves revert to East-West orientation in the period of the full Bell Beakers (*ibid.* 1973: 47). Evidence from the more developed metal-working cultures of Central Europe points to a continuation in some areas of the basic Corded

Ware RWSM/LESF pattern. This is the predominant pattern from the Nitra cemetery at Branč and from others in South-West Slovakia (Susan Shennan, pers. comm.). In other areas, such as those of the developed Unetice culture in Central Germany, burial for both sexes on the right with Southern and Eastern line of sight becomes the pattern (Gimbutas, 1965: 259).

Interpretation and Conclusions

From the available skeletal information it has been shown that a pattern of Beaker burial exists in Yorkshire which comprises males buried on their left, orientated East and looking South and females on their right, orientated West and also looking South, the LESM/RWSF burials. This pattern can only definitely be shown to have been established in Yorkshire in Step 4 of Lanting and van der Waals' scheme. There is a suggestion, difficult to prove on the small amount of evidence available, that the burial pattern of step 1/2 Beakers differed from this; if so, it would be in keeping with the position in Wessex, where, with continued Beaker development through from Step 1, burial evidence suggests a burial pattern different from that of Yorkshire with a predominance of Northern orientation and Eastern line of sight. There seems little likelihood consequently that the Yorkshire Beaker pattern was transmitted from developed Beaker groups further south; lack of burial evidence from the East Anglian focus area makes the possibility of diffusion from there impossible to verify. Nor is it likely to have derived from indigenous traditions and been absorbed in developed form into Beaker cultural practice since the evidence of burials representative of some indigenous element, those with Food Vessels in particular, does not indicate unified patterns available from which that of the Beakers could have been drawn. It suggests rather that the Beaker pattern was adopted in part by Food Vessel and allied culture elements, while its patterns of sexual distinction were used indiscriminately or altered in the face of new cultural criteria. It does not seem possible, in face of the invariable primary position of Beakers in relation to Food Vessels within the barrows that the influence of burial tradition would have been from Food Vessel community to Beaker group rather than the other way around, and that Beaker groups would have derived a whole new pattern from assorted elements of Food Vessel practice. It is even less feasible in the light of the striking antecedents to the pattern which exist on the Continent and are linked through Dutch Beaker culture development to the Yorkshire examples. That the Corded Ware—single grave complex has very direct bearings on the evolutionary stage of Beaker development is undeniable when the parallels in burial pattern are considered. There is evidence of European traditions in orientation, which have a distinction in right and left side placement for the sexes, undergoing a transformation and being subsequently found with the method of sexual distinction reversed. This demonstrates that such a reversal is not an uncommon phenomenon, and could well have happened during some development phase of early Beakers which retained a basically traditional Corded Ware burial pattern.

As has been suggested above, the initial adoption of the Beaker pattern by the Yorkshire Food Vessel communities seems more than likely on the evidence, and

especially in view of the mutual use of barrows, common association with other types of artefact and the consequent general picture of contact over a period of time. The difficulty is one of deciding whether those numbers of Food Vessel burials which do not follow the LESM/RWSF Beaker pattern represent a degeneration of the tradition, a continuation of a surviving Neolithic practice, the influence of an earlier Beaker pattern such as might have existed for Steps 1/2 or the effect of further influence from more developed European cultures where the right side placement for males was the norm. Patterns of Northern orientation and Eastern line of sight, as well as those with a continued southern line of sight have been shown to exist during this period in areas of Europe for which cultural links with our insular cultures can be demonstrated. Without some form of detailed typology, or hopefully even chronology, for the pottery form referred to throughout this paper as the Food Vessel, the assessment of the role of any one or of a combination of the above factors in the development of the full Early Bronze Age burial patterns in Yorkshire is not possible.

The interpretation of the patterns themselves is an equally difficult problem. The crouched position is now generally accepted to represent sleep (its being symbolic of the foetus in the womb and consequently of a spiritual rebirth is discounted since it credits the Neolithic mind with a grasp of female physiology and advanced metaphysics that is difficult to prove). Death and sleep were very likely indistinguishable in their outward manifestation to prehistoric peoples and the possibility of burial while rigor mortis retained the stiffened shape of a body which had died in sleep is more than probable. The crouched position is a feature of such Neolithic articulated burials as have been found in long barrows (Ashbee, 1970: 62) and in chambered tombs such as the Lanhill example (Keiller and Piggott, 1938: 127) and goes back further to some of the earliest burials known, even the young man from Le Moustier itself (Coles and Higgs, 1969: 219). Its appearance in the Yorkshire barrows is therefore not to be wondered at; the precise nature of its deposition, however, is a matter of considerable interest.

The intricate process by which an orientation pattern is developed, and the highly capricious human element involved in its evolution, as demonstrated by primitive societies and historical religious records (Ucko, 1969: 262-280) is a strong deterrent against any attempt to suggest the significance of the burial patterns described above. However, with a pattern of such wide-ranging parallels as that of the Yorkshire Beakers some attempt at assessing its role must be made. The differentiation of male and female burials is one feature of the pattern more easily explained than others. The reasons for placing males on their left and females on their right may have been as symbolic and as lost in the culture's past as the reasons for the present day differentiation of "pink for a little girl and blue for a boy". That it could have originally been a standard representation of the sexual roles appears possible when we compare the traditions of tribes in Nigeria and Ghana who place the male on his right looking to the East and the rising sun so that he will know when to get up for the morning's hunt or the day's work on the farm and the female on her left looking to the West so that she will see the sun set and know it is time to prepare the evening meal (Ucko, 1969: 272-3). There is also the possibility that

patterns based on real criteria such as these could be absorbed by other cultures and adapted to suit their social needs without the full significance of the sexual differentiation being retained.

The widespread occurrence of a pattern based on apparently similar criteria such as is detectable in the Late Neolithic—Early Bronze Age cultures in Europe does suggest some uniting force linking geographically separate peoples. Consequently the universal appearance of burials with line of sight South and East has been taken as an indication that the sun was the governing body for burials of this period in Europe (Gimbutas, 1965: 259). This need not necessarily carry the implication of a glorious pan-European sun cult, but need only imply, as is obvious with primitive societies, that the sun, the one main source of heat and light, was the pivot on which their waking lives turned and by which the ritual of sleep and death were orientated. In face of the otherwise impossible task of discerning localised objects of orientation, this is the most tempting and possibly the only opinion it is possible to reach. An equally attractive explanation for the appearance of burials with a Northern line of sight cannot be found unless one can hopefully assume that these, like some Ashanti burials (Ucko, 1969: 273), were expected to turn over immediately after burial and therefore ultimately face South!

In a society of increased technological ability with an increasingly complex burial ritual combining the dual rites of inhumation and cremation, we must expect the devolution of such tight-knit burial patterns as the Yorkshire Beaker groups exhibit. The cultural criteria on which they were based must lose strength and significance as the society evolves and their explanation must become as elusive to those who once practised them as they are now to the archaeologist. But, while regretting the inability to explain these patterns in terms of the philosophy of those who used them, we must place importance on the fact that they are discernible at all. This fact helps to underline the continuous links that must be seen between Britain and Europe in this period, links that need not be merely based on the exchange of commodities or skills, such as results in the widespread appearance on one chronological horizon of pottery of similar design, metalwork of similar character and ornament of similar sophistication, but must include some degree of movement of peoples who affect the very nature of the burial ritual of the land in which they settle. The remains of the "LESM/RWSF burial folk" are consequently as important an indicator of the cross continental links which produced the cultural amalgamation that is Bronze Age Britain as is the evidence of the ceramic product which accompanied them.

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Abstract

This paper, using material extracted from the nineteenth century reports of Mortimer and Greenwell, examines the patterns of orientation discernible amongst crouched inhumations beneath round barrows in the Yorkshire Wolds. It demonstrates a distinct pattern for Beaker graves of Southward facing skeletons, males on their left orientated East and females on their right orientated West. Parallels are found for this form of deposition on the Continent, in particular among Corded Ware and allied cultures, but these differ from the British Beaker pattern in their method of distinguishing the sexes, placing males on their right, females on their left. The less distinct, but putatively no less significant Food Vessel burial patterns are described and the paper seeks to clarify cultural factors affecting these patterns by analysis of burials containing a range of other grave goods. Relevant burial statistics for Beaker and Food Vessel burials are included as appendices.

Abbreviations used in Appendices

- Arch. : Greenwell, W. G. Recent researches in barrows in Yorkshire, Wiltshire, Berkshire, etc. *Archaeologia*, LII: 1-72. 1890.
 Greenwell : Greenwell, W. G. *British Barrows*. 1877.
 Mortimer : Mortimer, J. R. *Forty years researches in British and Saxon burial mounds of East Yorkshire*. 1905.
 E.R.A.S. : *Transactions of the East Riding Antiquarian Society*.

REFERENCES

- Ashbee, P. 1970 *The earthen long barrow in Britain*. London: Dent.
 Bateman, T. 1861 *Ten years' diggings in Celtic and Saxon grave hills in the counties of Derby, Stafford and York, from 1848 to 1858*. London: J. R. Smith.
 Bognár-Kutzián, I. 1963 *The Copper Age Cemetery of Tiszapolgar-Basatanya*. Budapest: Akadémiai Kiadó.
 Buchvaldek, M. and Koutecký, D. 1970 *Vikletice, ein schnurkeramisches Gräberfeld*. Prague: Universita Karlova.
 Clark, J. G. D. 1932 The date of the plano-convex flint knife in England and Wales. *Ant. J.* XII: 158-162.
 Clarke, D. L. 1970 *Beaker pottery of Great Britain and Ireland*. Cambridge, at the University Press.
 Coles, J. M. and Higgs, E. S. 1969 *The Archaeology of Early Man*. London: Faber.
 Fischer, U. 1956 *Die Gräber der Steinzeit im Saalegebiet*. Berlin: de Gruyter.
 Gallay, G. 1972 Beigaben der Frühbronzezeit Süddeutschlands in ihrer Verteilung auf Männer- und Frauengräber. *Homo*, Heft 1/2: 50-73.
 Gimbutas, M. 1965 *Bronze Age Cultures in Central and Eastern Europe*. The Hague.
 Glob, P. V. 1948 *Studier over den Jyske Fukeltgravskultur*. Copenhagen: Gyldendalske Boghandel.
 Greenwell, W. G. 1877 *British Barrows*. Oxford: Clarendon Press.
 Greenwell, W. G. 1890 Recent researches in barrows in Yorkshire, Wiltshire, Berkshire, etc. *Archaeologia*, LII: 1-72.
 Harrison, R. J. 1974 Origins of the Bell Beaker cultures. *Antiquity*, XLVIII: 99-109.
 Häusler, A. 1963 Ist eine Ableitung der Schnurkeramik von der Öckergrabkultur möglich? *Forschungen und Fortschritte* 37, Heft 12.

PATTERNS OF BURIAL ORIENTATION IN THE ROUND BARROWS OF EAST YORKSHIRE

- Häusler, A. 1969 Die östlicher Beziehungen der schnurkeramischen Beckerkulturen. *Die neolithischen Beckerkulturen im Gebiet der DDR und ihre europäischen Beziehungen*. (ed. H. Behrens and F. Schlette) Berlin: WEB Deutsche Verlag der Wissenschaften.
- Keiller, A. and Piggott, S. 1938 Excavation of an untouched chamber in the Lanhill long barrow. *P.P.S. IV*: 122-150.
- Lanting, J. N. and van der Waals, J. D. 1972 British Beakers as seen from the Continent. *Helinium*, 12: 20-46.
- Lanting, J. N., Mook, W. G. and van der Waals, J. D. 1973 C-14 chronology and the Beaker problem. *Helinium*, 13: 35-58.
- McAdam, E. 1974 *Some aspects of Early Bronze Age short cists in Scotland*. M. A. thesis, University of Edinburgh.
- Mortimer, J. R. 1905 *Forty years researches in British and Saxon burial mounds of East Yorkshire*. London: A. Brown & Sons.
- Neustupný, E. and J. 1961 *Czechoslovakia before the Slavs*. London: Thames and Hudson.
- Petersen, F. F. 1972 Traditions of multiple burial in Later Neolithic and Early Bronze Age England. *Arch. J.* 129: 22-55.
- Piggott, S. 1963 Abercromby and after: the Beaker cultures of Britain re-examined. *Culture and environment*. (Ed. I.Ll. Foster and L. Alcock) London: Routledge and Kegan Paul.
- Shepherd, I. A. G. 1973 *The V-bored buttons of Great Britain*. M.A. thesis, University of Edinburgh.
- Simpson, D. D. A. 1968 Food Vessels: associations and chronology. *Studies in Ancient Europe*. (Ed. J. M. Coles and D. D. A. Simpson) Leicester University Press.
- Stead, I. M. 1957 The excavation of Beaker burials at Staxton, East Riding. *Y.A.J.* XL: 129-144.
- Struve, K. W. 1955 *Die Einzelgrabkulture in Schleswig-Holstein*. Neumünster: Karl Wachholtz Verlag.
- Suliminski, T. 1968 *Cord Ware and Globular Amphorae*. London, Athlone Press.
- Thurnam, J. 1871 Ancient British barrows. *Archaeologia*, XLIII: 285-544.
- Treinen, F. 1970 Les poteries campaniformes en France. *Gallia Préhistoire*, XIII, pt. 1: 53-107 and pt. 2: 263-332.
- Tuckwell, A. N. 1970 *The possible significances of the orientation and positioning of skeletons in the round barrows of the Yorkshire Wolds*. M.A. thesis, University of Edinburgh.
- Ucko, P. J. 1969 Ethnography and archaeological interpretation of funerary remains. *World Arch.*, 1, 2: 262-280.

APPENDIX I: BURIALS WITH BEAKERS

*Proposed
Classification
According to
Scheme of
Lanting and
van der Waals*

Burial Information

Barrow

Name and Number

Side

Orientation

*Line
of
Sight*

*Sex
Where
Stated*

*Burial
Reference and*

*Original
Beaker
Illustrations*

*Clarke
Corpus No.
and
Classification*

Acklam Wold	124	B/L	NE	SE	M	Mortimer, 91	fig. 217	1210; S1	5
Acklam Wold	204	R	N	W	—	Mortimer, 86	fig. 196	1211; S4	7
Aldro	54	L	E	S	—	Mortimer, 64	fig. 131	1213; N/NR	4
Aldro	116	L	NE	SE	—	Mortimer, 54	fig. 99	1218; S2(W)	6
Aldro	116	R	SW	SE	—	Mortimer, 54	fig. 95	1217; S2(W)	5
Aldro	116	R	NE	NW	—	Mortimer, 55	fig. 100	1215; AOC	1 1/2
Aldro	116	L	NE	SE	—	Mortimer, 55	figs. 101-3	1219; SH3(C)	7
Aldro	116	R	N	W	—	Mortimer, 55	fig. 104	1216; S1	4
Driffild	C38	L	E	S	M	Mortimer, 274	fig. 745	1265; N2(L)	4
Folkton	CCXLII	L	E	S	—	Arch., 10	fig. 3	1280; S4	7
Ganton	XXI	L	E	S	M	Greenwell, 162	fig. 101	1283; S2(W)	6
Ganton	XXI	L	E	S	—	Greenwell, 166	fig. 83	1284; S3(E)	6
Ganton	XXVIII	R	—	—	F	Greenwell, 175	[cf. fig. 83]		
Garrowby Wold	104	R	S	E	M	Mortimer, 135	fig. 347	1293; S2(W)	6
Garrowby Wold	C43	R	W	S	F	Mortimer, 147)	—	—	—
Garrowby Wold	C43	R	E	N	—	Mortimer, 147)	—	—	—
Garton Slack	37	B/L	E	S	M	Mortimer, 209	fig. 510	1296; S1	6
Garton Slack	75	R	W	S	M	Mortimer, 223	fig. 576	1298; S1	5
Garton Slack	80	L	E	S	M	Mortimer, 236	fig. 597	1299; N/NR	3
Garton Slack	81	R	W	S	F	Mortimer, 240	—	1301F; —	—
Garton Slack	81	R	W	S	—	Mortimer, 241	fig. 608	1300; N/NR	4
Garton Slack	161	B/L	N	E	M	Mortimer, 211	fig. 527	1303; N2(L)	5
Garton Slack	C63	L	SE	SW	—	Mortimer, 214	fig. 538	1304; N3	4
Garton Slack	C63	L	E	S	M	Mortimer, 215	fig. 540	1305; N3(L)	5
Garton Slack	C63	R	W	S	F	Mortimer, 215	fig. 543	1306; N3	4
Goodmanham	XCIX	R	NW	SW	F	Greenwell, 308	(figs. 133 (and 81	1310; N/NR)	3
Goodmanham	XCIX	R	NW	SW	—	Greenwell, 308	fig. 134	1311; N1D)	4
Goodmanham	CXIII	L	NE	SE	M	Greenwell, 321	fig. 86	1309; N3	7
Hanging Grimston	55	L	E	S	—	Mortimer, 100	fig. 241	1314; SH4(B)	5
Hanging Grimston	55	L	N	E	—	Mortimer, 101	fig. 243	1324; S2(W)	6
Hanging Grimston	55	L	N	E	—	Mortimer, 101	fig. 246	1323; S2(E)	4
Hanging Grimston	56	R	SW	SE	F	Mortimer, 99	—	1322; N2	—

APPENDIX I: BURIALS WITH BEAKERS

Barrow	Name and Number	Side	Orientation	Line of Sight	Sex Where Stated	Burial Reference and Illustrations	Original Beaker Illustrations	Clarke Corpus No. and Classification	Proposed Classification According to Scheme of Laning and van der Waals
	Hanging Grimston 56	L	E	S	—	Mortimer, 99	fig. 238	1320; S2(E)	5
	Hanging Grimston 56	L	E	S	—				
	Huggate Wold 216	R	W	S	—	Mortimer, 310	fig. 927	1332; S1	5
	Huggate and) 254	(R	W	S	—	Mortimer, 320	fig. 955	1334; N2	4
	Warter Wold)	(R	W	S	—	Mortimer, 320	—	1335; N2	4
	Humanby OCL	R	W	S	—	Arch., 18	—	—	—
	Humanby OCLI	L	SE	SW	—	Arch., 21	—	1339F; —	—
	Middleton-on-the-Wolds								
	Painsthorpe Wold	L	E	S	M	E.R.A.S., 103	pl. II	1347; S2	6
	Painsthorpe Wold 4	L	SW	NW	M	Mortimer, 115	fig. 270	1351; S2(W)	6
	Painsthorpe Wold 4	R	W	S	F	Mortimer, 115	fig. 271	1352; S1	5
	Painsthorpe Wold 4	L	SE	SW	—	Mortimer, 117	fig. 282	1353; FP	6
	Painsthorpe Wold 83	L	E	S	—	Mortimer, 119	—	1355F; S3(W)	5
	Painsthorpe Wold 83	L	E	S	—				
	Rudstone LXI	R	W	S	F	Greenwell, 230	—	1366; N2	4
	Rudstone LXII	L	SE	SW	M	Greenwell, 237	fig. 83	1371; E.Ang?	4
	Rudstone LXII	L	E	S	F	Greenwell, 237	fig. 82	1376; N3(L)	5
	Rudstone LXII	L	S	W	M	Greenwell, 240	—	1367; N2	4
	Rudstone LXIII	R	S	E	—	Greenwell, 247	—	1011; S4	7
	Rudstone LXVI	R	W	S	F	Greenwell, 254	fig. 122	1374; S2(E)	5
	Rudstone LXVI	—	E	—	—				
	Rudstone LXVI	R	W	S	—	Greenwell, 255	—	1375; N2	4
	Rudstone LXVII	R	NW	SW	F	Greenwell, 258	—	1376; AOC	1/2
	Sherburn VII	R	—	—	—	Greenwell, 146	—	1384; N2	4
	Thwing LX	L	E	S	—	Greenwell, 227	—	1398F; —	—
	Thwing LX	L	E	S	—	Greenwell, 227	—	1397; S2(E)	6
	Towthorpe 21	R	—	—	F	Mortimer, 11	fig. 27	1400; S2(W)	5
	Towthorpe 211½	R	W	S	F	Mortimer, 19	fig. 41	1402; N2	4
	Towthorpe 211½	L	E	S	M				
	Weaverthorpe XLII	L	E	S	M	Greenwell, 193	—	1403; N3	5
	Willerby XXXII	L	SE	SW	—	Greenwell, 180	—	—	—
	Willerby CCXXXV	L	N	E	—	Arch., 2	—	1408; AOC	1/2

APPENDIX II: BURIALS WITH FOOD VESSELS

Barrow	Burial Information			Sex Where Stated	Burial Reference and	Original Food Vessel Illustration
	Name and Number	Side	Orientation	Line of Sight		
Acklam Wold	204	R	E	N	Mortimer, 84	fig. 183
Acklam Wold	205	R	W	S	Mortimer, 87	fig. 201
Acklam Wold	206	R	N	W	Mortimer, 89	fig. 182
Acklam Wold	208	R	W	S	Mortimer, 89	fig. 205
Acklam Wold	209	B	S	-	Mortimer, 90	fig. 207
Acklam Wold	211	L	E	S	Mortimer, 93	fig. 219
Aldro	52	B	W	-	Mortimer, 62	fig. 127
Aldro	87	R	S	E	Mortimer, 67	fig. 138
Aldro	88	B/L	W	N	Mortimer, 58	-
Aldro	94	R	S	E	Mortimer, 82	-
Aldro	94	R	S	E	-	-
Aldro	C59	L	E	S	Mortimer, 69	fig. 145
Aldro	C59	L	N	E	Mortimer, 70	fig. 146
Aldro	C59	L	S	W	Mortimer, 70	fig. 147
Aldro	C59	R	S	E	Mortimer, 70	-
Aldro	C76	R	W	S	Mortimer, 72	fig. 153
Bempton	CCLIII	R	W	S	Arch., 28	-
Bishop Burton	CCLV	L	E	S	Arch., 31	fig. 9
Bishop Burton	CCLVIII	R	W	S	Arch., 34	-
Blanch	237	B/R	SW	SE	Mortimer, 326	fig. 973
Blanch	238	R	NE	NW	Mortimer, 326	fig. 979
Calais Wold	23	B/R	S	E	Mortimer, 154	fig. 398
Calais Wold	C70	R	E	N	Mortimer, 170	-
Cowlam	LVI	R	NW	SW	Greenwell, 214	-
Cowlam	LVI	L	SE	SW	Greenwell, 214	-
Driffield	C86	R	W	S	Mortimer, 284	-
Fimber	C33	B/R	NW	SW	Mortimer, 190	fig. 832
Folkton	LXXI	R	S	E	Mortimer, 275	fig. 483
Folkton	LXXI	R	E	N	Greenwell, 278	[cf. fig. 71]
Folkton	CCXXXVII	R	W	S	Greenwell, 278	[cf. fig. 72]
Folkton	CCXXXIX	R	W	S	Arch., 5	fig. 2
Folkton	CCXL	R	S	E	Arch., 8	[cf. fig. 2]
Folkton	CCXLI	L	E	S	Arch., 9	-
Folkton	CCXLII	L	NE	SE	Arch., 11	-
Folkton	CCXLIII	L	NE	SE	Arch., 12	fig. 4

APPENDIX II: BURIALS WITH FOOD VESSELS

Barrow	Burial Information			Sex Where Stated	Burial Reference and		Original Food Vessel Illustration
	Name and Number	Side	Orientation	Line of Sight			
Ganton	XVII	R	SW	SE	Greenwell, 157		—
Ganton	XXI	L	E	S	Greenwell, 161		fig. 69
Ganton	XXI	R	SW	SE	Greenwell, 163		[cf.fig. 69]
Ganton	XXI	L	E	S	Greenwell, 163		[cf.fig. 72]
Ganton	XXI	R	NW	SW	Greenwell, 163		—
Ganton	XXIII	R	S	E	Greenwell, 168		[cf.fig. 69]
Ganton	XXV	R	NW	SW	Greenwell, 170		[cf.fig. 72]
Garrowby	32	B	S	—	Mortimer, 146		fig. 390
Garrowby	42	L	E	S	Mortimer, 144		fig. 384
Garrowby	63	R	S	E	Mortimer, 142		fig. 377
Garrowby	101	R	E	N	Mortimer, 136		fig. 358
Garrowby	101	B/R	S	E	Mortimer, 136		fig. 360
Garrowby	101	R	E	N	Mortimer, 137		—
Garrowby	104	R	W	S	Mortimer, 135		fig. 353
Garrowby	120	R	NW	SW	Mortimer, 147		fig. 394
Garrowby	C69	L	E	S	Mortimer, 139		fig. 369
Garrowby	C97	R	S	E	Mortimer, 143		fig. 380
Garrowby	C98	B	N	—	Mortimer, 143		fig. 382
Garton Slack	37	R	NE	NW	Mortimer, 210		fig. 515
Garton Slack	40	B/R	S	E	Mortimer, 229		fig. 588
Garton Slack	74	R	E	N	Mortimer, 221		fig. 568
Garton Slack	75	R	E	N	Mortimer, 222		fig. 570
Garton Slack	75	L	E	S	Mortimer, 223		[cf.fig. 570]
Garton Slack	79	L	E	S	Mortimer, 242		—
Garton Slack	C40	B/R	S	E	Mortimer, 244		fig. 613
Garton Slack	C40	B/R	W	S	Mortimer, 244		fig. 615
Garton Slack	C40	R	W	S	Mortimer, 244		—
Garton Slack	C40	R	E	N	Mortimer, 244		—
Garton Slack	C40	L	W	N	Mortimer, 259		figs. 724 and 725
Garton Slack	C41	L	E	S	Mortimer, 216		fig. 547
Garton Slack	C51	R	NE	NW	Mortimer, 218		fig. 526
Garton Slack	C51	L	N	E	Mortimer, 219		fig. 563
Garton Slack	C53	R	W	S	Mortimer, 212		fig. 529
Garton Slack	C53	L	E	S			
Garton Slack	C54	L	NW	NE			
Garton Slack	C62	L	NE	SE			

APPENDIX II: BURIALS WITH FOOD VESSELS

Barrow	Burial Information			Sex Where Stated	Burial Reference and	Original Food Vessel Illustration
	Name and Number	Side	Orientation	Line of Sight		
	Garton Slack C67	R	S	E	Mortimer, 243	fig. 612
	Garton Slack C67	R	-	-		
	Garton Slack C71	R	E	N		
	Garton Slack C71	L	E	S	Mortimer, 225	fig. 579
	Garton Slack C71	L	E	S		
	Garton Slack 274	R	S	E		
	Goodmanham XC	R	W	S	Mortimer, 270	fig. 735
	Goodmanham XCVII	R	W	S	Greenwell, 300	[cf.fig. 70]
	Goodmanham CII	R	W	S	Greenwell, 304	[cf.fig. 70]
	Goodmanham CIII	R	W	S	Greenwell, 312	[cf.fig. 70]
	Goodmanham CXI	L	W	N	Greenwell, 313	[cf.fig. 70]
	Goodmanham CXI	L	E	S	Greenwell, 319	[cf.fig. 71]
	Goodmanham CXI	L	NE	SE	Greenwell, 320	-
	Goodmanham CXIII	R	E	N	Greenwell, 322	fig. 136
	Goodmanham CXIV	R	W	S	Greenwell, 324	[cf.fig. 69]
	Goodmanham CXV	L	SE	SW	Greenwell, 324	[cf.fig. 70]
	Goodmanham CXVIII	R	E	N	Greenwell, 328	[cf.fig. 69]
	Goodmanham CXIX	R	N	W	Greenwell, 328	[cf.fig. 69]
	Hanging Grimston 9	R	W	S	Mortimer, 107	fig. 253
	Hanging Grimston 12	L	NE	SE	Mortimer, 105	fig. 250
	Hanging Grimston 27	L	N	E	Mortimer, 110	fig. 261
	Heslerton V	L	E	S	Greenwell, 142	fig. 70
	Huggate Wold 225	R	E	N	Mortimer, 302	fig. 902
	Huggate Wold 225	L	E	S	Mortimer, 302	fig. 905
	Huggate Wold 228	B	SW	-	Mortimer, 305	fig. 913
	Huggate and Watter Wold 246	L	E	S	Mortimer, 314	-
	Huggate and Watter Wold 250	B/R	S	E	Mortimer, 315	fig. 939
	Hunmanby 28	R	W	S	Arch., 18	-
	Life Hill 270	L	N	E	Mortimer, 200	fig. 495
	Life Hill 294	B/R	N	W	Mortimer, 201	fig. 499
	Life Hill 294	B/L	E	S	Mortimer, 203	fig. 500g
	Life Hill 294	R	SE	NE	Mortimer, 204	-
	Londesborough CXXII	L	SE	SW	Greenwell, 331	[cf.fig. 69]

APPENDIX II: BURIALS WITH FOOD VESSELS

Barrow	Burial Information				Burial Reference and		Original Food Vessel Illustration
	Name and Number	Side	Orientation	Line of Sight	Sex Where Stated		
Painthorpe Wold	4	L	SE	SW	-	Mortimer, 114	fig. 267
Painthorpe Wold	98	R	W	S	M	Mortimer, 131	fig. 338
Painthorpe Wold	98	R	N	W	F	Mortimer, 132	-
Riggs	20	R	S	E	M	Mortimer, 176	fig. 443
Riggs	36	R	W	S	-	Mortimer, 173	fig. 434
Riggs	36	B/R	E	N	-	Mortimer, 173	fig. 436
Riggs	36	R	E	N	-	Mortimer, 174	fig. 437
Riggs	41	B/R	S	E	-	Mortimer, 181	fig. 456
Riggs	C49	R	E	N	M	Mortimer, 172	fig. 432
Riggs	C49	R	E	N	-	Mortimer, 173	-
Rudstone	LXII	L	NW	NE	F	Greenwell, 235	[cf.fig. 72]
Rudstone	LXIII	R	W	S	M	Greenwell, 248	[cf.fig. 71]
Rudstone	LXVII	R	W	S	M	Greenwell, 257	[cf.fig. 71]
Rudstone	LXVII	R	N	W	F	Greenwell, 258	-
Rudstone	LXVII	R	S	E	F	Greenwell, 259	[cf.fig. 71]
Sherburn	XI	R	W	S	-	Greenwell, 149	[cf.fig. 69]
Sherburn	XII	R	NE	NW	M	Greenwell, 150	[cf.fig. 69]
Sherburn	XII	L	W	N	-	Greenwell, 152	fig. 72
Sherburn	XIII	R	W	S	F	Greenwell, 153	[cf.fig. 69]
Sherburn	XIII	L	S	W	M	Mortimer, 11	-
Towthorpe	18	L	E	S	-	Mortimer, 12	fig. 26
Towthorpe	21	R	SW	SE	-	Mortimer, 14	fig. 29
Towthorpe	43	R	E	N	M	Greenwell, 194	fig. 74
Weaverthorpe	XLIII	R	W	S	-	Greenwell, 195	[cf.fig. 69]
Weaverthorpe	XLIII	L	W	N	-	Greenwell, 198	[cf.fig. 69]
Weaverthorpe	XLIV	R	E	N	F	Mortimer, 49	-
Weaverthorpe	XLIV	L	E	S	-	Greenwell, 184	[cf.fig. 71]
Wharram Percy	66	R	N	W	M	Mortimer, 340	-
Willerby	XXXV	R	W	S	-	Mortimer, 340	-
Ungruoped	277	L	S	E	F	Mortimer, 340	-
Ungruoped	277	R	N	W	M	Mortimer, 340	-

The Environmental Background to Prehistoric Sites in the Fara Region of the Western Negev

by DAVID PRICE WILLIAMS

The members of the British Western Negev Expedition are grateful to the Department of Antiquities, Israel, to Professor Ofer Bar Yosef and his colleagues, to the Department of Botany, Hebrew University, to the Arid Zone Research Department, Beer Sheva, to the University of the Negev, Beersheba and to many other individuals and institutions who made the fieldwork possible.

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The initial results of the environmental archaeological survey of the Western Negev have already been published (Price Williams, 1973a, Price Williams, 1973b). The 1974 field season, the third to date, has now resolved many of the fundamental problems which the first two seasons created. The principle of the expedition is to undertake an Interdisciplinary study of a specific area, to examine its ancient and modern topography, its present and past botanical material, the chemical and mechanical construction of its soils, its hydrological and erosional history and the extent, distribution and dates of its ancient sites. The aim of such a study would be to provide a background, in depth, to the ecology and positioning of ancient sites in the area throughout archaeological time, and to try to understand their interrelationship and their economic bases in the light of any changes, major or minor, in the total environment.

The Area

The region of the Western Negev chosen for the survey is the area around Tell Fara (Sharuh) on the Wadi Gazze (Nahal Besor) 25 kms. south of Gaza, extending about three kilometres NW-SE along the Wadi and one kilometre on either side, in all some six square kilometres. This area was chosen because it contained the necessary combination of environmental and archaeological information. Being an area which is prone to semi-aridity, minor fluctuations in environment would tend to have a critical effect upon settlement and utilization of the area which would be reflected in the archaeological record.

Archaeology

The archaeological evidence from the specific area is sometimes prolific and at other times apparently very sparse. The Lower Palaeolithic Period is represented in the main by sporadic often unrecorded pieces which have not been found in an *in situ* deposit. The Petrie expedition (McDonald, 1932: 15) accumulated a number of hand axes, some patinated, some not, which were collected unprovenanced by workmen; some are marked "Wadi Mashebbba" but others are unmarked though they probably come from the Fara region. A number have been published (Moir, 1930) and the remainder are in the Institute of Archaeology collections. Apart from this Lower Palaeolithic material, the present expedition noted a number of heavily rolled 'Clactonian flakes' in the wadi bed. It should also be noted that there is a fairly extensive collection of Upper Acheulian material found *in situ* some 12 kilometres North West along the Wadi at Kissufim (Ronen, Gilead Shachnai & Saull, 1972: 68).

The Middle Palaeolithic period is extremely well represented in the area (Price Williams, 1973b). Along the riverine slopes of the wadi on both banks and presently exposed by the deep down-cutting of the badland erosion, numerous locations of Mousterian artefacts are to be found representing the accumulation of overlapping lenses of debris covering several hundred square metres. The lithic material is stratified in a series of horizons and is generally found undisturbed in primary deposition, being compounded with floor debris — quantities of bone and charcoal. The sites give the impression that during this time the area was extensively used over a considerable period. Comparable material occurs some 55 kilometres SSE in the area of Advat in the Central Negev (Marks, 1970) and to the north, the Levantine littoral has significant densities of similar though not identical material at Mt. Carmel.

The dearth of Upper Palaeolithic material is as noticeable as the plethora of the Middle Paleolithic. Despite intensive ground survey in this and the surrounding areas, few indications of this period were evidenced. There was no concentration of material to be found, and it was not possible to identify even isolated artifacts with any certainty. This occupational lacuna in the Fara area, whilst it may be significant as a change in settlement pattern, should be seen against a background of quite frequently evidenced Upper Paleolithic elsewhere in southern Israel, at such sites as 'Ein 'Aqev and Avdat in the Central Negev, (Narks, 1970, Marks, 1969) at a site in the Haluzta Dunes some 20 kilometres south of Fara (Noy, 1970) and even as close as Zeelim, 8 kilometres south south east of Fara (Ronen, Yosef and Perrot, 1967). Further extensive Upper/Epi-Paleolithic sites are reported currently from surveys of North Sinai.

The Epi-Palaeolithic and Neolithic periods again are not to be found in the vicinity. Undoubtedly, as with the preceding archaeological period, the relevant strata are available for study but site surveys have failed to produce evidence of occupation. Occasionally, pieces from the surface might possibly be designated Meso- or Neolithic, but without supporting evidence such isolated pieces have to be ignored. At any event, the Neolithic period is to date not well represented anywhere in the Negev, a pattern with which Fara is consistent.

Sites of the Chalcolithic period are particularly common along the banks of the Wadi here. A number of these sites on the upper surfaces of the banks were excavated by McDonald in 1929/30 (McDonald, 1932). They were further surveyed by Anati in 1952-5 (Anati, 1963) and also by Perrot in the 1960's. (Perrot, 1962). Unfortunately there is no record of the precise position of any of these surveyed sites, for even in the case of McDonald, his "map of sites" omits their location. The material which is available for study and the present site survey confirm that the sites are to be compared with those of the Beersheba culture (Perrot, 1955) and clearly the sites must represent several phases of sporadic agriculture in the area.

Unlike the mainstream development of the Levant, the Early Bronze Age does not mark the commencement of local urbanism. A number of sites of the Early Bronze Age do occur at Fara, as with McDonald's Site H (McDonald, 1932: 11), but these sites give the impression far more of a continuance of the sporadic agricultural economies of the Chalcolithic than the incipient urbanism that marks this period in other areas.

From the Middle Bronze Age (c. 1750 BC) an urban site dominated the area, built on a high exposed sandstone bluff overlooking the wadi. The site, Tell Fara itself, seems to have been developed purely for strategic reasons, having been built as a fortress firstly by the Hyksos in the Middle Bronze II period, then refortified by the Egyptians in the Late Bronze Age, both in LBI and again in LBII. It was rebuilt in Iron Age I around the 11th and 10th centuries and lastly during the Roman period. The final fortress would seem to date from the period of Vespasian in the 1st century AD after which it was abandoned. Throughout its history the site had been occupied not so much as part of the natural urban colonisation of the area, but rather as a military fortress guarding the Egyptian border first for one side then for the other.

Brief sporadic farming is seen again in the area during the latter half of the sixth century AD when the Byzantine population lived briefly in scattered farmsteads. The following Arab invasion seems to have prompted the semi-nomadic Bedouin to colonize this part of the Negev until the end of the 19th century when attempts were made by the late Ottoman administration to quieten the Bedouin by resettling Egyptian fellahin along the Wadi about 1880, and it is they who provide the most recent occupational evidence of very simple isolated houses supporting individual families by the use of silt-dam agriculture.

Geology

The north western Negev lies along an area of contact between two major structural units — the ancient crystalline bloc of Arabia, and the largely uplifted and disturbed deposits of the Tethys sea. To the south there are considerable areas of igneous and metamorphic rock, and eastwards the great fault system of the Rift Valley cuts through all pre-existing structures. To the north the country is dominated by the folds and domes of limestone forming the Judaeian hills, the southerly extension of the Lebanon mountain chain, with later deposits banked against their western flank to form the coastal plain. Underlying the Beersheba steppe are a long series of marine, littoral and lacustrine levels,

culminating in Eocene chalk and soft limestone. Hard rock outcrops are, however, rather rare, as the steppe is largely blanketed by Pleistocene and Recent loess covering not only the Eocene strata, but also irregular zones of sands and loosely cemented sandstone probably dating from late Pliocene regressions. The superficial loess deposits give way to sand sheets and dunes farther south. These blanket deposits and the variety of solid outcrops mean that *in situ* flint or chert is very restricted. Wadi floors however are thickly lined with cobbles and gravels of a most varied lithology, a result of the region's long alluvial history. Flint and chert pebbles abound, some of which, like the pebbles of a breccia-like chert which is found as a capstone near Avdat, can be confidently assigned to a source area, others are heavily rolled and even beach-battered and probably have a very long history of sorting and redeposition.

Geomorphology

Tell Fara lies on the main trunk of the Nahal Besor. This is a major Wadi draining a large area (c. 3400 km²) of southern Palestine. The Beersheba drainage basin is roughly triangular in shape, its apex at the wadi-mouth at Gaza, its base along the regional watershed which continues approximately the summit-line of the Judean hills. To the north it extends almost as far as Hebron and down to Sede Boqer in the south. (Fig. 1). In the area of Fara the wadi describes a series of incised meanders, its bed some 25 metres

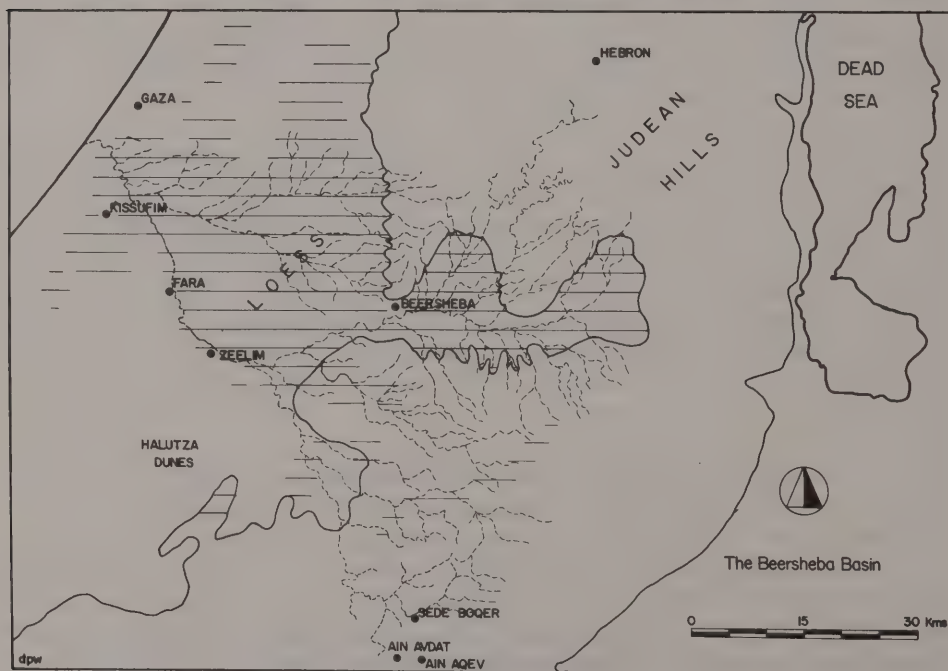


Fig. 1 The total extent of the loesses in its present form

below the present surface of the loessal plain. Slip-off slopes with an average gradient of 1:30 are cut across the interior curves of the meanders. The extent and depth of these surfaces indicate a considerable period of downcutting. The wadi at present is lined with a thick drift of cobbles, gravel, sand and silt, subject as might be expected, to considerable resorting and minor channel cutting with each winter's floods. Although the gravels form a continuous basal deposit to the wadi bed in the immediate neighbourhood of the tell, a short distance downstream the wadi is running over *in situ* calcareous sandstone, so the wadi cannot be running in a refilled channel.

Above the wadi bed lie strata of bedded sands of variable grade and slope, largely cemented in a calcareous matrix. Two distinctive types of deposits can be identified within the sands. At the base of the tell, and in a few deep gullies there is an almost level, homogeneous layer of rounded, orange-red medium sand, which has the appearance of a beach deposit, with a maximum depth of about 4 metres. Above this lie a series of sharper sands of more mixed grade, in places cemented into horizontal flags, in others showing considerable dips. These can best be explained as fossil dunes left behind and perhaps driven inland during a period of falling sea-level, probably in late Pliocene times. The irregular topography of these dunes has been very largely levelled and filled-in by the thick blanket of loess which now covers the area. Because of the nature of the loess deposition any estimate of average thickness is almost meaningless, the deepest infill, to the north-east of the tell is approximately 25 metres thick, while there are geological and archaeological indications that the highest parts of the tell itself were covered only by a thin skin of loess, if they were covered at all.

Because of the archaeological evidence it may be assumed that the deposition of loess is comparatively recent (beginning some fifty thousand years ago) and continued until about four to five thousand years BC, when it diminished considerably. The column of material between these two presumed dates as it is revealed in the sections shows very considerable differences in rates of deposition and erosion. The loess column is by no means homogeneous but displays periods of relatively uninterrupted aeolian deposition, of stabilization, erosion, resorting, and possibly of soil-formation. The evidence of these different processes can be observed in the deposits with reasonable certainty. It is more difficult to interpret them in terms of climate, vegetation and land-use.

There must obviously have been a certain degree of erosion, whether linear or lateral, of this loessal surface throughout and since its deposition. It is worth noting, however, that no coherent system of drainage is observable in the Fara region, although such a system is present in the neighbourhood of Beersheba itself. There is a general slope down to the wadi sides along a band perhaps a half kilometre wide parallel with the channel, caused perhaps by lateral erosion of unconsolidated material during dry periods. It should be remembered in this connection that the channel-full flow of the wadi must always have been exotic, responding to rain in the hills rather than to local conditions, and that this flow would usually have been powerful enough to carry away locally derived material, and wind-borne material, from the wadi floor, and thus to have maintained a sharp vertical drop and a considerable potential for down-cutting between the wadi-floor

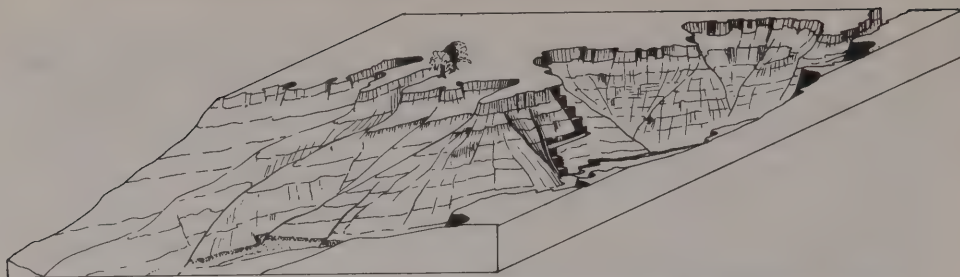


Fig. 2 Block diagram of part of the deep gully system around site O showing step trenches cut between the country surface.

and the surrounding surface. A comparatively slight change in climate or land use would thus be able to trigger off a considerable and even spectacular phase of erosion, as has been happening in the area in recent years. There are large areas of badland erosion bordering the wadi, cutting down through the loess-filled depressions and to a lesser extent through the fossil dunes. The badlands areas have a chaotic morphology and it is not easy to detect any meaningful patterns in the web of gullies and residuals. (Fig. 2). Certain points of interest do emerge however. There do appear to have been two periods of erosion, at least. Near the wadi there are a series of more or less rounded residuals with wide channels between them. Back from these there are steeper-sided, even canyon-like gullies terminating in a steep back-wall, and separated only by narrow spines of residual surfaces. These residual surfaces have an average slope of 1:7 towards the wadi. In many parts of the badlands the back-wall, almost vertical in places, stands above a pediment of derived material, cut by the active gullies. The most likely explanation for this stepped profile might lie with the nature of the country surface. This surface is immediately underlain by hard strata partially cemented by calcareous concretions, which appears to act as a capstone, maintaining a sharp vertical edge until undercut. Once this happens material is slumped and washed across another hard layer some three to four metres below the first. This second layer is not concretionary but consists of a compact clayey deposit, possibly representing a period of consolidation. When this is breached the gullies descend very rapidly, sometimes even by means of swallow-holes, to low angle floors grading down either to the floors of the larger and presumably earlier gullies or else to gravels of the main wadi. Although the evidence is scanty there does also seem to be evidence of one other type of erosional phase. Beneath and in the lower levels of the loess there are patches of sand and fine gravel, mostly water laid, but the sands in some cases showing bedding angles suggestive of duning. It seems likely therefore that there were times when sand washed or blown from the surrounding fossil dunes replaced or alternated with the loessal depositon.

In a number of places at the present day springs emerge through the wadi floor. None is of great strength or volume, not enough to maintain a permanent flow in the wadi, but their flow does seem to be perennial, even through dry years. There are no tufa deposits in the area (any forming would presumably be carried away by the annual floods) and so there is no direct evidence of the antiquity of these springs. It is not at all impossible

though, that there has always been a certain amount of flow or seepage at the lowest levels exposed in the area. Such water sources would obviously be of the great importance to early settlement.

Climate

The Climate of the Levant is largely governed by two strong gradients. Overall rainfall falls off from north to south and from west to east, while average temperatures, annual and daily temperature variations and evaporation rates rise strongly from west to east, that is, away from the coast. Average humidity, however measured, is greater along the coast and lessens inland. These gradients arise from the combination of a number of factors. The circulation pattern of the Mediterranean accounts for the north to south rainfall gradient, and the regional topography of hill country parallel with the coast for the eastward fall. This morphology which cuts off the interior from the ameliorating influence of the sea is similarly responsible for the higher temperatures, lower humidity and greater variability encountered inland.

Much of the Negev lies in the belt of steppe country between the Mediterranean climatic zone of the Levant coastland, which continues around the piedmont of the Tauros and Zagros uplands, and the arid bloc of North Africa and Arabia. Divisions between these climatic zones are not, of course, clearcut. The Mediterranean zone enjoys warm summers, cool winters with a rainfall peak in December and January (in places a double peak), moderate daily and annual temperature variations, and along the coasts a relatively high humidity. The arid zone has high and extremely high summer temperatures (Southern Mesopotamia records some of the highest in the world) and overall rainfall deficit (that is, annual rainfall totals are below potential evaporation) but with what rainfall there is concentrated in the winter months. As well as being generally low, rainfall totals can also vary enormously from year to year, as can daily and annual temperatures. Away from the monsoonal coasts of the Persian Gulf humidity is low or very low, increasing the potential evaporation rates. This zone covers the whole of the eastern part of North Africa, with the exception of Tripolitania, Egypt, Sinai, and Arabia. An extension of the zone occurs in the Wadi Araba and the southern Dead Sea area, and it continues inland of Moab to cover the Syrian desert and Mesopotamia. Between the two zones the dry steppe occurs in the Levant. Almost absent in North Africa it starts in the North Negev, follows the interior uplands of Jordan and Syria, broadens out in the Jazira of North Syria and loops south east through Assyria and the Zagros foothills. Although somewhat similar in appearance, its climatic origins are quite unlike those of the steppe country of Eurasia and the prairie of America. Temperatures and rainfall lie between those of the Mediterranean and arid zones, although there is still an overall water deficit. Temperature variations and rainfall variability are high, though not as great as those of the desert interiors, and humidity low. It follows a topographical belt of plains and low uplands.

The area around Tell Fara then lies in the junction between these three climatic belts. (See Fig. 3).

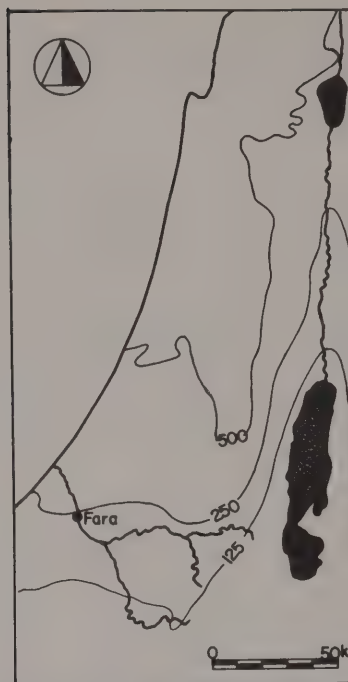


Fig. 3 Average rainfall in millimeters since 1930, showing Fara on the marginal 250 mm isohyet

Botany

Over three hundred present day species of plants have so far been recorded from the marginal semi-arid survey area at Fara, a fact which certainly supports Zohary's statement that the flora of Palestine is amazingly rich and varied. (Zohary, 1962: 39). The main reason for this diversity is that the country as a whole, and Fara in particular, lies at the junction of three main uni-regional phytogeographic areas as shown by the accompanying map (Fig. 4). These are:—

a) The sub-humid Mediterranean belt with a rich flora including many endemic genera and species and a natural vegetational climax consisting of maquis and erophytic trees such as *Olea* and *Juniperus*.

b) The semi-arid Irano-Turanian belt, which includes the immediate vicinity of Fara. This is part of the vast inner Asiatic steppe region, with the largest number of endemic genera and species and a steppe grassland and vegetational climax, interspersed with dwarf shrubs (chamaephytes).

c) The arid Saharo-Arabian area which extends from the Sahara, across the Arabian desert to the Sind desert in India. Within this vast expanse of sparse vegetation there are only a few endemic plants.

One further uni-regional phytogeographic zone occurs here, reaching its

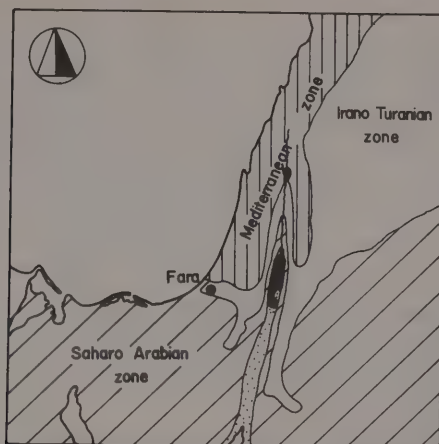


Fig. 4 The plant-geographic zones of the Levant, showing Fara at the junction between the three main zones. northernmost limit; this is the tropical Sudanian belt which is represented by only about twenty species, mostly trees and shrubs.

The present flora of Fara has a predominance of Irano-Turanian species as expected together with many representatives of the other three uni-regional groups. Some bi- and pluri-regional species are also found, the majority of these being segetals or ruderals. Two other important factors have certainly affected the present plant cover:—

i) Many micro-environments exist here, as in all marginal areas. These are greatly influenced by very minor climatic fluctuations so that the ecology of the area is subject to almost continuous change.

ii) The flora has been greatly affected by agriculture and archaeological evidence suggests that this has been practiced in the Negev since Chalcolithic times.

Human interference has not been restricted to ancient agriculturalists. The persistent depredations of Bedouin sheep and goat herds probably account for the rather barren appearance of the area apparent in photographs taken by the Petrie expedition (Petrie, 1930). The present government policy of Bedouin resettlement has resulted, since 1948, in a considerable amount of plant re-colonization.

A catalogue of species collected to date is summarised in the 1972 expedition report (Price Williams, 1973b). Similarly, the micro-zoning which governs the plant distribution in the area is also outlined here. Worthy of particular mention however are the four tree species currently occurring within the survey area; the date palm, *Phoenix dactylifera*, which is probably a Bedouin introduction; *Tamarix nilotica* (= *T. gallica*) which forms comparatively large stands along the wadi bed; *Tamarix articulata* (*T. aphylla*) which has been planted on the present country surface; and *Acacia raddiana*, a Sudanian plant which according to Zohary dominated the Southern Mediterranean during the Miocene. The *Acacia* is therefore an example of a relic vegetation which has escaped destruction either by occupying well-sheltered habitats or by developing biotypes capable of withstanding environmental change.

Analysis

The above discussion has illustrated the diversity of the area and the possibilities for minor alterations in climate, ecology etc. to allow these zones of environmental influence to interchange within the region and thus alter its potential for utilisation by man. Following the 1974 season, it is now possible to put forward a hypothesis illustrating that variations in utilisation/settlement are governed by variations in the environmental background. This hypothesis is necessarily tentative and is certainly generalised, but it serves as a basis for the essential compilation of the multi-disciplinary evidence now collected. Three main periods are postulated:—

- i) The Middle Palaeolithic Phase *c.* 40,000 years ago.
- ii) The Upper Palaeolithic — the Late Neolithic Phase *c.* 40,000-4,000 BC.
- iii) The Chalcolithic — Modern Phase *c.* 4,000 BC to the Present.

i) Middle Paleolithic Phase

The Mousterian evidence, as has been said, is prolific. The locations of material are to be seen on the accompanying topographic plan (Fig. 5) at sites B, D, H, and O on the right bank of the Wadi, and sites E and F on the left bank. The term 'site' here strictly implies a location of material rather than a focal deposit, since in some cases the 'sites' are marked only by recent erosional processes and must originally have been continuous. Further these locations represent only that material which is *in situ*; many other locations were noted where similar lithic material was found in abundance but lying unstratified upon erosional surfaces.

The gross stratigraphy of these sites is varied. Those on the left bank, where the fossil dunes form high cliffs along the wadi, are situated very high up, at 99m. OD for site F, sitting on the dune surface beneath a skim of loess. Associated with this unpatinated, *in situ* material is an amount of patinated but unrolled material of similar lithic origin which has been 'lowered' onto the dune surface as the loess has gradually eroded away. On the right bank, the lowest material is to be found in the basal gravels upon which the wadi presently flows. Wherever these gravels are exposed undisturbed, that is, not in the wadi bed itself but where it has been cut open by the wadi, then Mousterian tools and debris are to be found, both in the original matrix of the gravel and also lying on its surfaces at a height of about 80m. OD. In such cases, it clearly underlies the loess of the area. Some of the lithic material shows little or no damage either from rolling or patination, indicating that although it appears in the gravel matrix, it cannot have been much reworked or redeposited. More frequently however, the material is dramatically battered. In some cases, what would seem to be flakes are found only as a rolled bulb of percussion, the remainder of the flake facets having been smashed off by the tumbling action of the heavier cobbles.

To test the validity of the stratigraphic position of this material, a number of soundings were made (Oi, ii, iii, iv) at the base of an extremely deep gully in the north-west of the badlands where the gravels which underlie the loess had been exposed to a distance of over half a kilometre from the present wadi course. Whilst the amount of

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lithic material found is too small a sample to be statistically or typologically significant, it would by its location imply the appearance of Mousterian man in the area before the deposition of the main loess column.

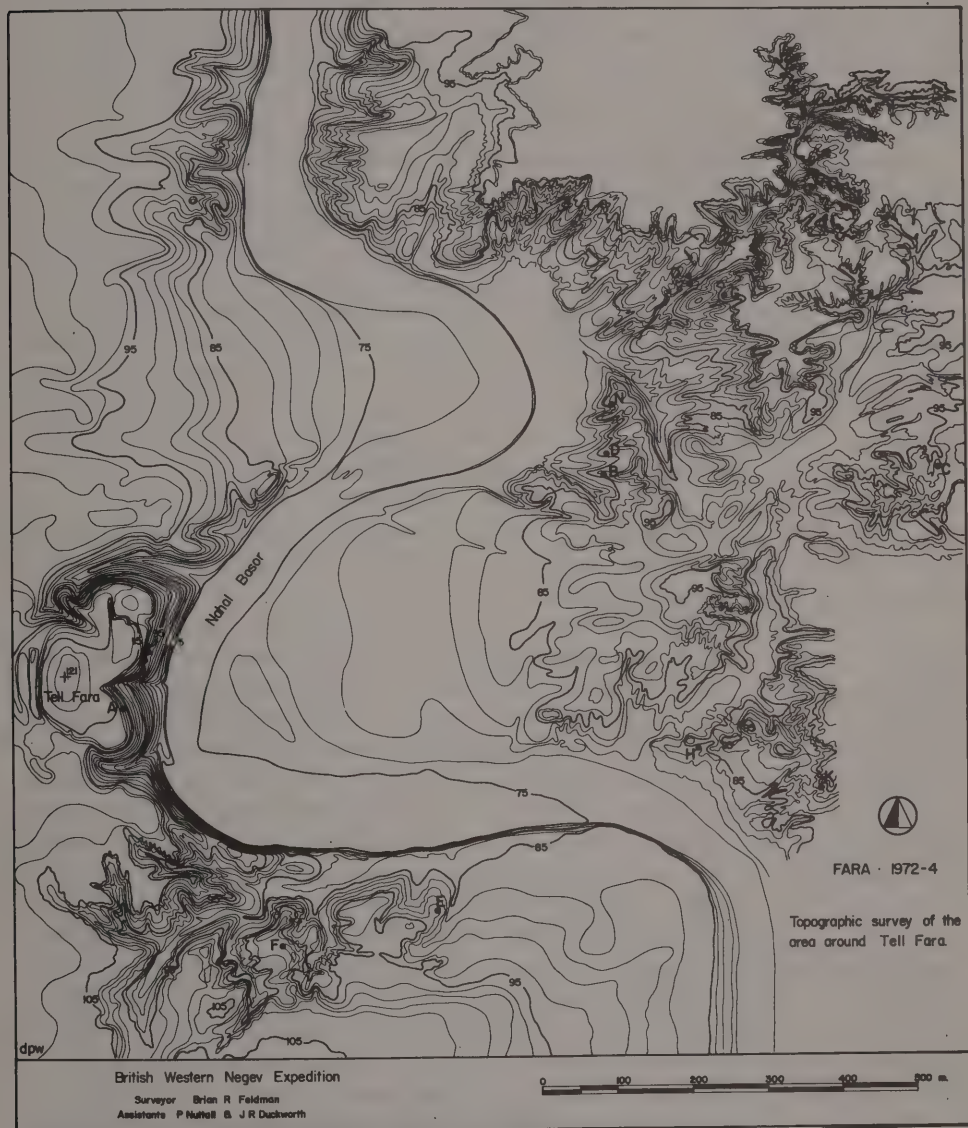


Fig. 5 Tacheometric survey including the main archaeological sites; all heights are taken from the Israeli triangulation point on Tell Fara.

Above these gravels are found the richest of the Mousterian sites so far noted, being deposited in early horizons of loess, sometimes with additional layers of sands. The lithic material has been described before (Price Williams 1973b) and consists of Mousterian flakes and points with clear Levallois technique, pseudo-Levallois points, backed knives and a number of notched pieces, together with a great quantity of debitage. Retouch is not common, and neither are large tools of the period. Further, the distribution of cores varies from location to location, Site B so far being very poorly furnished, Site E seemingly containing more.

The stratigraphy of these sites has not yet been fully observed, but that of Site B has been seen in part and will serve to illustrate the complexity of this "post-gravel" Mousterian phase. At B there are certainly at least three well-defined floors extending in a sequence over a considerable distance. Four lesser deposits or lenses interleave with these three main floors and constitute a total of seven separate horizons of material within a 50 cms. deposit. The vertical reference for these layers had been made accessible by sounding the naturally eroded escarpment. Floor 1, at c. 84.00 OD (taken as datum for the site) is made up of a rich assemblage of flint and debris with considerable quantities of bone and charcoal. It lies in a compacted ashen loess to a depth of 5 cms. on a hard trampled surface, the whole deposit of which is overlaid by many minute waved layers of water-sorted loess, similar to those layers seen in annual puddling.

Floor 2, at 83.74 cms. OD has a thickness of some 4 cms. No part of this floor has been fully examined but the layer seems rich again in flint, bone and charcoal. The intervening layer between these two floors would appear to be sterile loess. Floor 3, at 83.54 cms. OD is similar, and has a thickness of 3-4 cms.

The mammalian remains that have so far been examined were removed either from the eroding surface material or the vertical sounding in the erosional face. In some cases, this would account for the obvious loss of some of the outer bone lammelli. The clearest identification has come from teeth, from which it is possible to identify *Bos primigenius* and *Equus hemionis*. When these floors are lifted fuller fauna will no doubt emerge.

Turning to the geomorphology of the period, the wadi system was certainly well established at this stage, and the area of its drainage basin must have been much as it is now. Channel deposits of the period appear to be very similar to those of the present day, of sizes ranging from cobbles to medium fine silt, deposited in clearly defined layers with little grading from one size to another. This sequence indicates, though not with absolute certainty, intermittent rather than continuous flow. Too little of the gravels of this period are exposed to be certain, but the indications are that the gradient of these upper surfaces are similar in degree and direction to those of the slip-off slopes, so that it is reasonable to assume that the wadi at this period was moving towards its present bed. The highest exposed gravels stand only some 5 metres above the present bed (at site O) which is a small amount of downcutting for the length of time involved.

Apparently connected with these high gravels is at least one tributary channel joining the wadi more or less at right angles. This channel is lined with fine sand and gravel which is fairly certainly derived from then exposed fossil dunes. (See Fig. 6). A later filling of

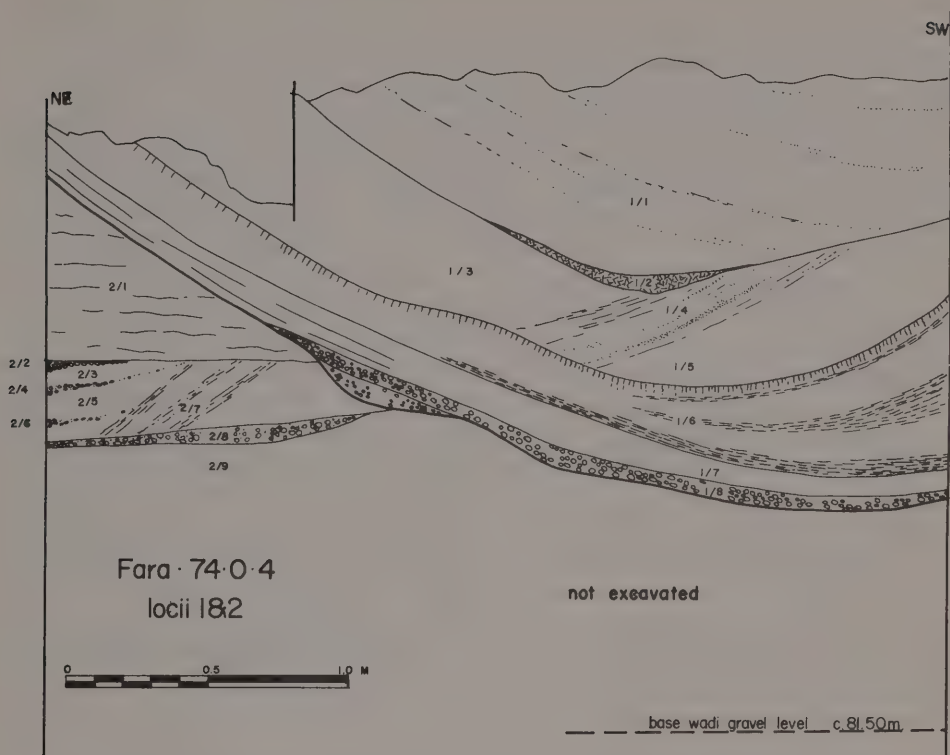


Fig. 6 Section of O4 with leaf impression layers. O4 is represented on the topographic map as the point furthest North of the three points at O.

the same channel is of much finer grade — silt and clay — of sufficiently fine texture to have encapsulated and preserved the shape of leaf impressions which were found within it, but also of a texture permeable enough to allow the infiltration of very fine oxidized clay particles which replaced the organic material. The leaf impressions were found in two clearly stratified zones (layers 1.2 & 1.6) with an intervening clay band. The lower band contained randomly arranged, heavily oxidized prints on which the venation and leaf shape, together with the petioles, could clearly be seen, though stomatal structure was absent. The preservation of these impressions and the nature of the sediments in which they lie clearly indicate slow-moving or still water conditions which would allow the undisturbed settling of organic and inorganic material; their morphology is consistent with that of deciduous bankside trees such as *Populus euphratica* and/or *Salix acmophylla*, both of which are to be found occasionally in Israel today though certainly not in the Fara vicinity. In the upper band of impressions, the prints are predominately more regularly arranged leguminous leaflets suggestive of a Mediterranean vegetation beside standing water. This picture would seem quite incompatible with a short local

drainage channel at its point of entry into an active wadi. Amongst other explanations, the deposition may have taken place in a spring-pool standing undisturbed above the flood level, but if the major leaf fall of these deciduous trees was in Autumn, it can hardly have been into waters affected by seasonal, that is Winter, flooding.

It may be worth pointing out at this point that associated with strata in the vicinity of Site B, that is of the same gross period, there was a horizon containing pollen. Unfortunately owing to the tangled morphology of filled stream beds which occur also at Site B as at O, the precise position of this deposit is no more than tentatively connected.

On present evidence, it would seem that the considerable activity witnessed in Mousterian times, both chronologically and spacially, is to be explained in terms of a climatically "wet" period, thus explaining the geomorphological, the botanical, the zoological and the archaeological evidence. Whether the sites, rich though they are, can be interpreted as living areas or simply as butchering sites will not be known until a full scale excavation has been completed. It is further difficult to evaluate the "richness" of these open sites since the singular preservational character of the fast-deposited loess in its early stages may have afforded a protection to these ephemeral deposits which would be missing in other areas round about, where such sites have long since vanished. Finally, as with the whole of Western Asia, the absolute dating of the Mousterian here is unattested. The lacuna in C14 data has meant that typological comparisons alone are used to point to a late date for Mousterian in the Levant, i.e. "The interstadial Wurm 11/111" (Bordes, 1968: 126), if such terms are in any way meaningful in this context. The present programme is currently experimenting with palaeomagnetic dating derived from the deposition of fine sediments in an attempt to review this position.

ii) Upper Palaeolithic – Neolithic Phase c. 40,000-4,000 BC

As has already been described, this long and varied period is not in the Fara region readily associated with evident archaeological deposits, at least in comparison to the Middle Palaeolithic sites. The Upper Palaeolithic period may however be the part of this phase which can at least slightly be evidenced. Site K in the south east of the region is a hearth site with associated bone and charcoal. A surface scatter of possibly identifiable Upper Palaeolithic date supports this proposition. The height of the deposit at 92m. OD is considerably higher than that of the nearest Mousterian sites, Site H at 87m. This position would be re-enforced in the vicinity of Site N. This deposit represents a small high level gravel bed, probably that of a stream that ran east and north through the loess. Among the light gravels are artefacts which show slight polishing by water action, but no heavy rolling. Whilst obviously in secondary deposition, the height of this material, at 88m., is some 4m. higher than the upper floor at Site B, the Mousterian site which is only some 100m. away in horizontal strata. The Site N material is suggestively Upper Palaeolithic. This situation would accord with the occurrence of other Upper Palaeolithic material in the Central Negev, in North Sinai and also at Zeelim, some 8 kms from Fara. On the other hand, the paucity of the evidence at Fara, despite exhaustive surveys rather suggests that

any Upper Palaeolithic material will indicate sporadic and non-nucleated utilisation of the area, and it is felt unlikely that a settlement pattern for this period will emerge.

Stratigraphically, this occupational paucity coincides with the period of major loess deposition in the area for the Mousterian levels are perpetually found very close to the base of and actually underlying the loess, whereas the Chalcolithic levels are immediately below the uppermost strata of the same loess column. It would seem then that the majority of the column, some 20m. or so, is bracketed between two periods, and that there is thus an apparent coincidence between the lack of human activity and the deposition of the loess itself.

The beginning of loess accumulation is presumed to be during the Mousterian period, and then continuing into this phase. Its main advent is marked by a thick homogeneous layer (up to 1 metre) of pale silt grade material which looks like undisturbed loess, its blocky structure, lack of bedding, few root holes and no signs of reworking suggesting pure aeolian deposition. Above this level lies a layer of fine to medium sand (at c. 85 OD) which is more difficult to interpret. The material is presumably derived from the fossil dunes, and both wind and water seem to have acted upon its deposition. Bedding planes in parts of it suggest water sorting, but some steeply angled faces argue for duning. The obvious interpretation is that the material is being washed off the exposed dunes in the winter and then water sorted in the summer. Above these two level then lies a long series of reworked and consolidated loess horizons.

In the main 20 metre column of loess, there are a few thin horizons which appear to be undisturbed aeolian material, but for the most part the deposits have been reworked slightly by water before being covered by fresh falls. It will take much careful work before a coherent history of the column can be written but even the gross appearance of the strata discloses a number of points of interest. Some layers show evidence of consolidation and seem to be the vestiges of palaeosols. Others consist of clay curls thinly coated with chocolate-brown ferric iron. Such curls can be found in the area today, but they occur only on barren ground. In the strata concerned these horizons have considerable lateral spread, which raises the interesting possibility of extensive flat stretches of unvegetated surfaces at times when there was enough rainfall to provide the necessary standing water, however ephemeral, in which these horizons develop.

It should be noted that throughout the long and complex history of this loessic column, erosional systems seem confined to lateral sheet wash or purely chemical erosion. There is very little evidence of other sorts of erosion such as gulying or the formation of dendritic patterns like those of the present day 'badlands'. The basic horizontality of the myriad layers of the column have not then been broken by violent downcutting which is so typical of the contemporary semi-arid regime. There are a few small filled channels, in one case lined with dune gravel, but they represent shallow channel beds. Also, there is no direct evidence of the position of the main wadi at these times — but the wadi must certainly have flowed between the Mousterian sites of B, D, & H and sites E & F, the position of the present tell. Neither are there benches or filled gullies to indicate any great change of level.

The palaeo-botanical evidence from this long and complex period is so far insufficient to point certainly to a particular flora. Froth flotation tests carried out on the 'palaeosols' have produced but scant remains, possibly because the horizons are so heavily oxidized. Pollen similarly has been difficult to isolate. In a number of instances however, horizons throughout the column have included quantities of charcoal. Preliminary electromicroscopic scans of this material indicate that the charcoal will provide material for identification in the near future, and is highly suitable for further detailed investigation using this technique. Apart from this, the only definite evidence to date comes from one of the rare filled channels at about 90.00 OD where, in the fine clays, leaf impressions have again been preserved, on this occasion of graminaceous plants suggestive of Irano-Turanian grasslands.

The combination of the lack of occupational evidence, together with the picture of the formation of arid-zone stabilization layers with a predominance of chemical erosion and with no 'badland' erosion, and what little botanical evidence there is available pointing to steppe grasslands, the period is construed as being rather drier than the preceeding one, possibly approaching total aridity at times. Whilst such a conclusion broadly fits the facts as known at present, it must not by its simplicity be allowed to obscure the obviously very complex variations which the period clearly includes. Whilst plant cover may well have been similar to the present day at certain periods, the present violent erosional pattern is nowhere evidenced during those times, which suggests less water availability. The deposition of the loess itself seems sometimes to be purely aeolian suggesting a dry period, and at other times water sorted suggesting annual puddling.

iii) Chalcolithic to Modern Phase

Despite the lack of Neolithic evidence, Chalcolithic sites are quite frequent along the wadi. Anati recorded no fewer than thirty (Anati, 1963: 296) whilst Perrot excavated at least two. During Petrie's expedition to the area, McDonald excavated at least ten of these sites (McDonald, 1932). The location of none of these sites is known exactly, though it might be conjectured from the topography. The sites seem to have been placed on or near the present country surface. From the stratigraphy of McDonald's sites, and from an examination of the present *in situ* material, it would appear that the majority of the sites lie about 50 cms. to 1m. below the top of the loess column. As a rule, the sites are set well away from the wadi, sometimes up to 1000m., and the access from the wadi to the sites, at least at present, is often through difficult terrain. It is tempting to see this distribution pattern as a clear result of agricultural requirements where the sites were focussed upon the growing areas and not upon the water supply, which must at this time have been the wadi springs.

As with all the Wadi Ghazze sites, it is assumed that none of these sites at Fara were permanently and continuously occupied, and they give the appearance of sporadic agricultural settlements used perhaps for a few years and then abandoned, hence their non-nucleated appearance on every headland of the wadi. Since McDonald has pointed to

the typological variations in material culture of the sites, one might further assume that this life-style continued in periodic use over a long time.

The sporadic nature of these agricultural sites of the Chalcolithic period is partly mirrored in the brief economy of the Byzantine period. The now-eroded farmstead (site C) indicates a short-lived attempt to cultivate the Negev during the sixth century. Similarly, the fellahin silt dams of the nineteenth century testify to another short-lived agricultural period. If one notes that beside these non-nucleated and sporadic farming periods the only urban development at Tell Fara is a strategic border fortress, then the settlement pattern of the whole phase would point to the present somewhat semi-arid and marginal conditions prevailing.

From a geomorphological stand, a point of importance in the depositional history of the area which is as yet unresolved is whether the loess deposition has stopped in recent times, or whether it continues still. The Byzantine site (C) was very near the present land surface, as were the Chalcolithic sites. If one calculates that the annual average build up of loess between the Mousterian period and the Chalcolithic was only between 0.5 and 1.0 mm. per year, then this figure, admittedly a gross oversimplification, would give 3-4m. since Chalcolithic times, and 60-70 cm. since the Byzantine period. As has been explained above, we cannot of our own observation place the Chalcolithic sites in the immediate neighbourhood in their stratigraphic setting other than by McDonald's sections, which allow only 50 cms. or so to have been deposited since the Chalcolithic period. Similarly, the Byzantine site was lowered rather than buried, so that what little evidence is available points at least to a slowing down of loess accumulation during the last few thousand years. (This may mean no more than that lateral erosion is keeping pace with deposition).

As to the erosional history of the near past, since the outlets of several gullies are blocked by silt dams of perhaps a hundred years ago, then the main outlines of the local badland drainage systems must have been established by then. The present phase of violent linear erosion is much newer however and is still going on. Similar deep gullying is taking place in other parts of the Levant and the East Mediterranean Basin. The causes of this phenomenon presumably lie with a combination of factors of changing climate and land use.

Conclusions

As described above, the proposed hypothesis inclines towards three gross environmental phases. The first phase is construed as a 'wet' Mediterranean phase of the Middle Palaeolithic period at some time around 40,000 years ago or even earlier; the second phase is the 'arid' steppe phase from the Upper Palaeolithic to the late Neolithic period — between 40,000 and 4,000 BC; the third phase is the semi-arid period of the present day, having extended from Chalcolithic times.

The interpretation of these phases is as always conjectural. Regarding the first of the phases, although the dating of the Middle Palaeolithic period in the East Mediterranean is largely conjectural, it would seem reasonable that the Fara 'wet' phase should coincide

with at least one of the several wet interstadial periods evidenced in the area, associated with partial deglaciation during the Würm. (Butzer, 1971: 302). Evidence of such incursions of the Mediterranean plant-geographical belt have been noted in North Africa (McBurney & Hey 1955: 109) at this time, preceeding an arid period.

The 'arid' phase at Fara coincides, as has been demonstrated, with the main deposition of the loess. The source area of this loess has been a matter of some doubt which becomes crucial to the present discussion. Reifenberg (1947: 37) states the classic view that the loess is a 'desert' loess formed by desert dust storms. To the south and east of Fara lie the deserts of Sinai and Arabia with vast reserves of loose surface material derived from the Nubian sandstone and which might be seen to be of a suitable grade. A shift then in the prevailing winds of this phase, from its present westerly direction to a southerly or easterly one, brought about perhaps by a deepening and southerly drifting of the East Mediterranean frontal system, might be seen to account both for the aridity and the loess.

Several factors militate against this conclusion. The phenomenon of desert-produced loess has recently been called into question (Smalley & Vita-Finzi, 1968: 766f) the argument centring around the nature of 'desert' loess and the production of the necessary volume. (Vita-Finzi & Smalley, 1970: 1367). On the other hand then, it is possible that the lowered sea levels evidenced in the Mediterranean area during the late Würm (Butzer, 1971: 225) combined with a prevailing westerly wind may well account for the change from moist winds to arid, loess-bearing winds. Given lowered sea levels, large areas of Nile silts would be exposed along the southern Levantine coast, providing thus a possible alternative or additional source. This theory has two attractions, for the prevailing winds of the Beersheba steppe are indeed westerlies, capable of transporting loess if a source were to be available, and also, the source availability depending as it would upon minor and frequent sea-level fluctuations might account for the obvious and complex differences of the loessic deposition. In this context, it should be noted (Fig. 1) that the distribution of the loess as currently plotted is very localized, forming a rectangle only some 30 kms. from north to south and stretching in an easterly direction from Gaza to Beersheba. It is precisely this area that would be affected by a deflation of Nilotic silts in such conditions.

The ending of loess deposition coincides with the return to semi-arid conditions in the area in Chalcolithic times. Current thinking on the return from the -100m. sea-level in 35,000 BP to its present position is that the present zero shoreline was reached by 4,000 BC. (Millman & Emery, 1968: 112lf). Thus the virtual cessation of loessic deposition, the return to present sea levels and the onset of semi-arid conditions seem all to be interlinked.

It must be said that if there is any substance to this hypothesis, then the Fara region must represent a micro-climatic region, experiencing conditions which need not obtain elsewhere in the Levant. It is for this reason that localizing of such study is so important, and why extrapolation to other areas cannot easily be envisaged.

PREHISTORIC SITES IN THE FARA REGION OF THE WESTERN NEGEV

Abstract

The third season of the British Western Negev Expedition has brought evidence of three main phases of environmental behaviour of the area around Tell Fara associated with variations in the activity of man. During the Middle Palaeolithic period (c. 40,000 BP) the area was intensively used by Mousterian populations as evidenced by their numerous stratified *in situ* living floors. Bone, charcoal, seed and pollen evidence together with leaf impressions point to a Mediterranean flora and fauna. The Upper Palaeolithic period to the Late Neolithic Periods (c. 40,000-4,000 BC) are very poorly represented archaeologically. The period is evidenced however in many strata of horizontally deposited loess of a complex depositional history but giving evidence of considerable aridity during this time. The third phase is from the Chalcolithic period to the present (4,000 BC-Present.) The area would seem to recover its present semi-arid appearance, with evidence of sporadic farming. Urbanism seems motivated only for strategic reasons. It is believed that the first phase coincides with an early Würmian interstadial, whilst the arid period of the second phase is a micro-climatic variation generated by the deflation of the Nile silts during a Late Würmian low sea-level, recovering its present semi-arid appearance when the sea-level was normalised.

REFERENCES

- Anati, E. 1963 *Palestine before the Hebrews*. London: Cape.
Bordes, F., 1968 *The Old Stone Age*. London: Weidenfeld.
Butzer, K. W. 1971 *Environment and Archaeology*. London: Methuen.
Marks, A. 1969 Prehistoric sites in the Central Negev *I.E.J.* 19.
Marks, A. 1970 Prehistoric sites in the Central Negev *Rev. Bibl.* 77.
Marks, A., Phillips, J., Crew, H. L. and Ferring R. 1971 Prehistoric sites near 'En 'Avdat in the Negev *I.E.J.* 21.
McBurney, C. B. M., and Hey, R. 1955 *Prehistory and Pleistocene Geology in Cyrenaican Libya*. Cambridge: Cambridge University Press.
McDonald, E. 1932 Prehistoric Fara. *Beth Pelet II* with Harding J. L. and Starkey, J. (ed. Petrie, W. Flinders) London: Quarich.
Millman, J. D., and Emery, K. O. 1968 Sea levels during the past 35,000 years. *Science* 162: 1121-23.
Moir, J. R. 1930 Flint Implements of Lower Palaeolithic Types from Palestine. *Journ. Royal Anthropol. Inst.* 485-499.
Noy, T. 1970 Prehistoric Sites in the Halutza Dunes MITEK UF80 Haeven 10: 1-10.
Perrot, J. 1955 The Excavations at Tell Abu Matar near Beersheba. *I.E.J.* 5: 17f. 73f. & 167.
Perrot, J. 1962 Nahal Besor a note in *Rev. Bibl.* 69: 388.
Petrie, W. Flinders 1930 *Beth Pelet I* London: Quarich.
Price Williams, D. 1973a Environmental Archaeology in the Western Negev. *Nature* Vol 242 No 5399: 501-3.
Price Williams, D. 1973b Preliminary Report of the Environmental Archaeological Survey of the area around Tel Fara *Archaeological Theory and Practice* (ed. Strong, D.) London: Seminar Press.
Reifenberg, A. 1947 *The Soils of Palestine*. London: Murby.
Ronen, A., Yossef, A., and Perrot, J. 1967 Une station kebarienne du Negev; le point 104. *B.S.P.F.* 64.
Ronen, A., Gilead, D., Schachnai, E., and Saull, A. 1972 Upper Acheulian in the Kissufim region. *Proc. Phil. Soc.* 116.
Smalley, I. J., and Vita-Finzi, C. 1968 The formation of fine particles in sandy deserts and the nature of 'desert' loess. *Journ. Sed. Petrology* 38: 766-774.
Vita-Finzi, C., and Smalley, I. J. 1970 Origin of Quartz Silt: Comments on a note by Ph.H. Kuenen *Journ. Sed. Petrology* 40: 1367-8.
Zohary, M. 1962 *Plant life of Palestine* Ronald Press.

Late Bronze Age and Earliest Iron Age in Siberia

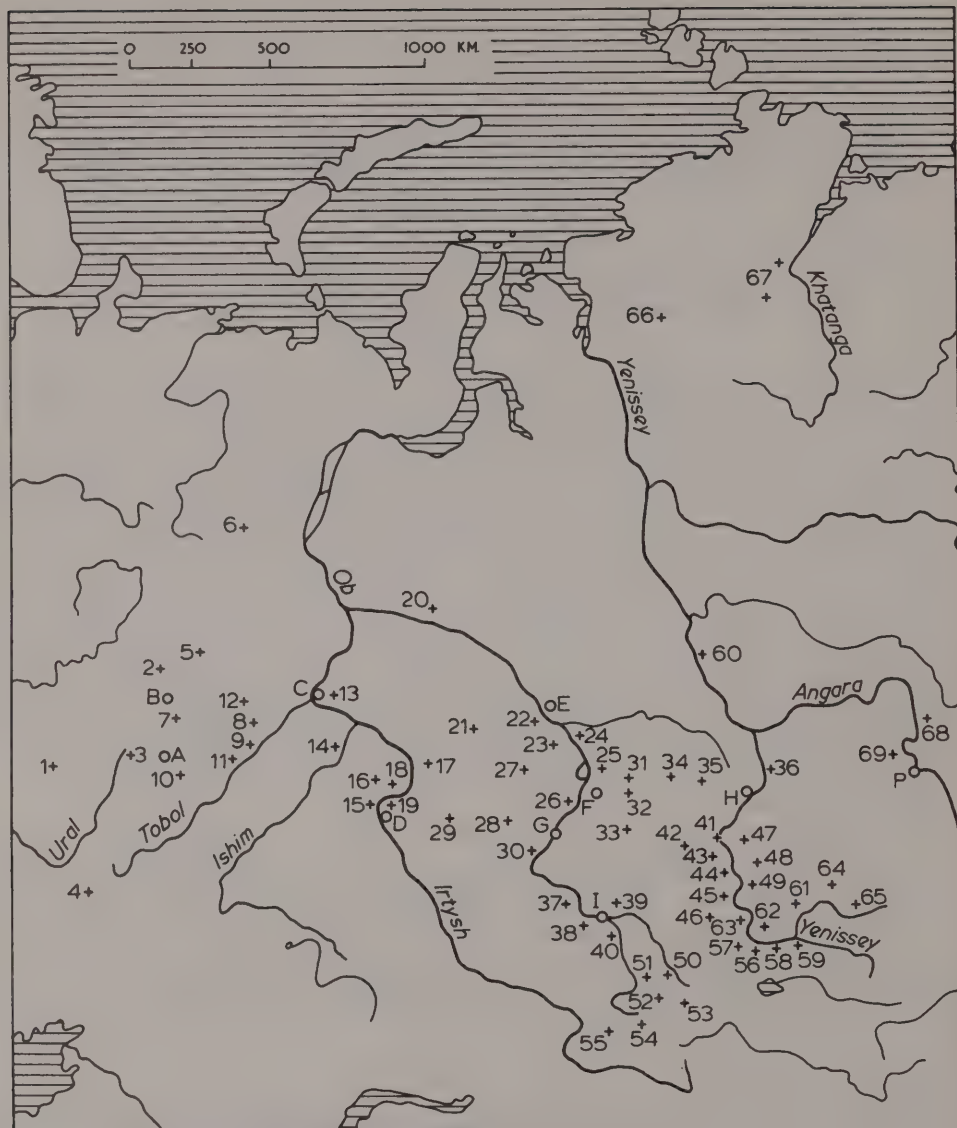
(A Guide to the Recent Literature on the Subject)
by T. SULIMIRSKI

The sixth report on the archaeological literature in the U.S.S.R. that appeared between 1968 and 1973, I intended to devote to the Late Bronze Age and the Early Iron Age of the Asiatic part of that country. However, because of the extent of the material which had to be taken into account the report is being divided into two parts and the present issue embraces only the relevant literature concerning the entire north of the country which, incidentally, from the administrative point of view forms part of the Russian S.S.R. The second part, dealing with the literature that relates to the Kazakhstan and a number of smaller Soviet Republics in Soviet Central Asia, has been deferred to the next issue of the *Bulletin*. As previously, mainly books, pamphlets and periodicals accessible in the main archaeological libraries in London were considered; they have been handled in about the same way as formerly. It should be emphasized that some of the publications quoted in my report on the late Bronze Age and Earliest Iron Age in the U.S.S.R. (*Bulletin* 8-9, 1970, 117) often relate to the area under review and I have had to refer to these again.

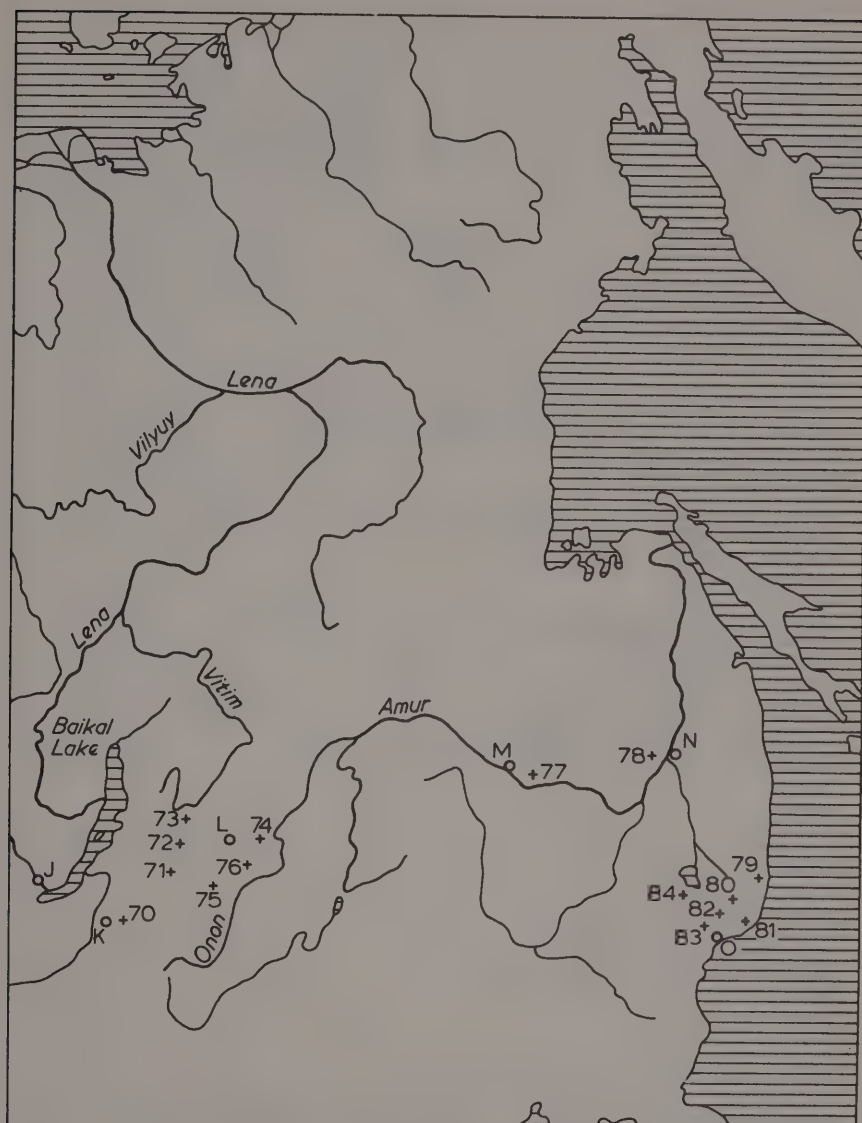
In my last report (*Bulletin* 11, 1974, 1) the book by D. B. Shelov (*Tanais and the Lower Don*, published [in Russian] 1972) was considered as the second enlarged edition of the book by the same author and under the same title published in 1970. However, in fact the 1972 edition is a continuation of the earlier book; it deals with the history of Tanais in the early centuries of the Christian era, whereas the issue in 1970 was devoted to the history of the city in the 3rd to 1st centuries B.C. (Note that on p.30 of my report 'A.D.' was erroneously put instead of 'B.C.')

Publications of a general character

Only two works known to me deal with Siberia as a whole, that is with the country which, according to present official nomenclature, comprises the forest zone of the Asiatic part of the Soviet Union. One of these books is *Istoriya Sibiri (The History of Siberia)* in five volumes. Volume I, entitled *Drevnyaya Sibir (Ancient Siberia)*, Leningrad 1968, 454 pages; chief editor A. P. Okladnikov) contains the history and archaeology of Siberia from the Palaeolithic to the 16th century A.D. The other work, *Drevnyaya Sibir (Ancient Siberia)*, 3, Novosibirsk 1970, 320 pages, 33 articles) bears the sub-title *Sibir i ee*



LATE BRONZE AGE AND EARLIEST IRON AGE IN SIBERIA



TOWNS

A.	Cheliabinsk	I.	Biisk
B.	Sverdlovsk	J.	Irkutsk
C.	Tobolsk	K.	Kyakhta
D.	Omsk	L.	Chita
E.	Narym	M.	Blagoveshchensk
F.	Tomsk	N.	Khabarovsk
G.	Novosibirsk	O.	Vladivostok
H.	Krasnoyarsk	P.	Bratsk

SITES

1. Zlatoust
2. Nizhniy Tagil
3. Miass (Miasskoe)
4. Chernorechie on the Ushkatta
5. Koksharovo (70 km. NE of Tagil)
6. Pyaksimovola on the severnaya Sosva
7. Settlements and earthworks SE of Sverdlovsk
8. Sites, settlements and earthworks around Lake Andreevskoe
9. Settlement Yazevo on the Tobol
10. Cemetery of Subbotino
11. Barrow grave cemeteries near the-junction of the Iset with the Tobol
12. Likhachevo near Tiumen
13. Ivanovka on the Irtysh near Tobolsk
14. Abatskoe
15. Kokonovka, Kushaly
16. Chernoozerie, Strizhevo, Setkulovo
17. Okunevo, Gornaya Bitiya, Bogdanovka, Ust-Tarka, Sibircevo
18. Sargatskoe on the Irtysh
19. Rostovka, Speranovka
20. Surgut, earthwork Barsov Gorodok
21. Noviy Vasiugan, Stepanovka, Manget, Tukh-Sigat
22. Basandayskoe earthwork, settlements Chuzik and Nalimach
23. Kulayka, Smolokurovskoe earthwork
24. Dessiatovo, Sarovskoe
25. Samus
26. Elovka
27. Barrow graves on the river Kenga
28. Czernyi Mys, Dubrovinskii Borok
29. Staraya Preobrazhenka
30. Bystovka, Ordynskoe, Zavaylovo
31. Serebriakovskii, Utinka, Nekrasovo
32. Uriup, Kamenka
33. Mikhailovka, Shestakovo, Novo-Ivanovka
34. Tisul, Krasnoe on the Tom
35. Achinsk, Belyi Yar
36. Korkino
37. Shtabka-Banaul
38. Ust-Pristanskaya, Kamyshenka, Klepikovo
39. Biisk
40. Staraya Surtayka
41. Saragash, Aeshka, Afanasievo Mountain, Bateni, Lake Sukhoe, Mount Barsuchikha
42. Podkamen: sites in the region of the river Iyus
43. Krasni Yar, Oglakhty, Luganskoe, Mokhova
44. Abakan, Temir
45. Oznachennoe, Letnik
46. Askiz, Ulus Uzun-Zhul, site on the Kiug, Kyzlas
47. Kamenka, Cheremushnyi Log, Mount Tepsey, Tes
48. Minusinsk, Unyuk
49. Shalobolino, Malye Minusa
50. Pazyryk

LATE BRONZE AGE AND EARLIEST IRON AGE IN SIBERIA

51. Bolshoy Ulagan barrow graves
52. Barrow graves on the Chuya
53. Kosh-Agach, Uzuntay
54. Berel in East Kazakhstan, barrow graves on the Sarymska
55. Katon-karay in East Kazakhstan
56. Chaa-Khol, Kara-Tal
57. Sites around the junction of the Khemchik with the Yenisey, Khemchik-Bom, Alady-Bel, Aymyrlyg, Kuylug-Khem, etc.
58. Shagonar, Argalykty
59. Kyzyl, Bay-Dag, Temir-sug
60. Podkamennaya Tunguska, Vorogovo, etc.
61. Turan (Turan-Uyug-steppe), the 'Arzhan Kurgan'
62. Kombuzhap-Aksy
63. Sites and cemeteries near the junctions of the Chinge, the Urgun etc. with the Yenisey
64. Barrow grave cemeteries on the river Ortaa-Khem
65. Sites and graves in the regions of Azas, Khochzhir-Khol and in the valley of the Biy-Khem (the Great Yenisey)
66. Sites on the rivers Pyasina Polovinka, Chernaya etc. on the Taimyr Peninsula
67. Sites on the rivers Kheta and Kheta=Khatanga as above
68. Junction of Ilim with the Angara, Karapchanka, Vorobievo
69. Sites on the Angara islands (Zhiloy, Fedorovskii, etc.)
70. Dureny, Ivolgino
71. Region of the Eravnoe Lakes
72. Isinga Lake, Altan
73. Sites at the junction of the Zaza with the Vitim
74. Ust-Liski, Ust-Ilia
75. Aginskoe
76. Tiukavkino on the Konda
77. Konstantinovka, Novopetrovka
78. Kukelevo
79. Settlement on Lake Dukhovskoe, earthwork in the region of Plastun
80. Krounovka
81. Valentin-Pereeshek
82. Shkotovo, Malaya Podushechka
83. Maykhe
84. Siniy Gay

sosedi v drevnosti (Siberia and its Neighbours in Antiquity) and is in fact a *festschrift* devoted to A. P. Okladnikov. The articles deal with the prehistoric past of the country from the Palaeolithic to the Bronze Age and contain reports on new excavations and research.

Besides these two other general books on the Archaeology of the Soviet Union mentioned in my former reports contain sections devoted to the relevant periods of the Asiatic part of the country. In addition there is the contribution, in German by Karl Jettmar (*Mittelasien und Siberien in Vortürkischer Zeit*, in 'Handbuch der Orientalistik' 5, Leiden-Köln 1966, 105 pages) in which tribal migrations within the central part of Asia during the period under review have been discussed and their significance for the history of wider areas underlined.

Of a rather general character are two books mentioned below, which deal with the past of more than one country. One of these is *Khunny; Sredinnaya Aziya v Drevnie Vremena (The Chunni; Middle Asia in Ancient Ages*, Moscow 1960, 292 pages) by L. N. Gumilev. The difference between the Chunni and the Hunns was discussed and the latter he considers to have been an amalgam of the Chunni with the conquered Ugro-Finnish peoples and then, in the 3rd-4th centuries A.D., with the Sarmatian Alans. Natural conditions in the Asiatic steppes, especially in the centre of Asia, the wars of the Chunni with the Chinese etc., have been dealt with in the work. The other book *Kultura Khunov i Noinulinskie kurgany (The Culture of the Chunni and the Graves of Noin-Ula*, Moscow-Leningrad 1962, 206 pages, 73 plates) by S. N. Rudenko concerns the Noin-Ula barrow graves (Mongolia) of the 3rd century B.C. and other burials, settlements, armament, tools, art, beliefs and relations with other peoples have been described.

Again of a general character, although somewhat more restricted in scope, is the article by V. N. Lysov (*SAS* 2, 1966, pp. 148 ff) dealing with general cultivation and the history and virtues of two plants, *Panicum miliaceum* (millet) and *Setaria italica* (foxtail millet). Grains and groats from these plants were found in remains dating to the end of the 2nd and early 1st millennia B.C.; grains from both these early finds imply that they must have been products of an already age-long cultivation and selection. In the past both plants were widely cultivated in the Far East and in China.

Since my last report was sent to the printers (*Bulletin* 11, 1974) new volumes of the yearbook *Arkheologicheskie Otkritia* (at present published in book form) have reached London and the six issues covering the years 1968 to 1973 have been taken into account here. The series is of great importance for grasping a notion of the extent of archaeological work in the U.S.S.R.

Finally two reports by A. A. Sementsov, P. M. Dolukhanov and E. N. Romanova (*SA* 1972-3, 209-219; *Radiocarbon* 14, 2, 1972, 336-367, the latter in conjunction with V. I. Timofeyev) should be mentioned as these bring the results of Carbon 14 determinations of a large number of archaeological samples from various parts of the Soviet Union, including Siberia. The sampling was done by the Laboratory LOIA (Leningrad branch of the Institute of Archaeology of the Academy of Sciences of the U.S.S.R.) during the years 1967-69. For the earlier reports see my report in *Bulletin* 8-9, 1970, 120.

Metallurgy and mining

The literature concerned with mining and metallurgy in the Soviet Union published up to 1969 was reviewed in my reports *Bulletin* 7, 1968, 46 and *Bulletin* 8-9, 1970, 121. The few articles missed in these have been dealt with here together with those published more recently.

An important work that appeared in the period under review is *Drevneyshaya metallurgiya Urala i Povolzha (The Earliest Metallurgy of the Urals and the Country on the Volga, Moscow 1970, MIA 172, 180 pages)* by E. N. Chernykh. This gives the results of mainly spectrographic analyses of about 2,000 copper/bronze articles in a series of graphs while a series of maps reveal the diffusion of the main products of the industry. A large bibliography on the subject is included. The work is concerned chiefly with the Urals and the Volga country but also deals, to some extent, with the Asiatic part of the Soviet Union. The chronology of some ancient metallurgical centres of the area shown in this work has been based on that of the Seima-Turbino bronzes, whose date has been improperly put at the 16th century B.C. These bronzes cannot be dated prior to the 14th century and probably should be the 13th century B.C. as shown by N. L. Chlenova, *Khronologiya pamyatnikov Karasukskoy epokhi, Moscow 1972, 135*. See also my *Prehistoric Russia, London 1972, 252*.

Two works are of particular importance. One, *Proizvodstvo v Tagarskuyu epokhu (Productive Activities during the Tagaskaya Period) (MIA 90, 1960, 116-206)* by Iu. S. Grishin was overlooked in my report (*Bulletin* 8-9, 1970) although the contribution of B. G. Tikhonov in the same volume of *MIA* was mentioned in *Bulletin* 7, 1968, 47. This work by Iu. S. Grishin discusses all kinds of production, metallurgical, agricultural and pastoral, and also the tools used in all fields of productive activities. The other work by the same author *Metallicheskie izdeliya Sibiri epokhi eneolita i bronzy (Metal Artifacts of Siberia of the Eneolithic and the Bronze Age, Moscow 1971, SVOD B-3-12, 88 pages, 18 plates, mainly half-tone, one map)* brings a list of a few hundred bronze articles found in Siberia, arranged according to their types within their relevant geographic groups. There is a special list showing the results of the spectrographic analysis of 193 articles and a brief characteristic of all types of artifacts distinguished is given in the text. A special chapter deals with the history of the development of Siberian metallurgy and its connections with the metallurgical centres of other areas and discusses the role of local cultures possessing Siberian metallurgical centres.

Discoveries mainly in the South Urals, the Minusinsk region and Khakassia, and in Tuva of new traces of ancient open-cast mining and of sites of copper smelting have been reported by several authors. E. N. Chernykh briefly reports (*AO* 1968, 150) the results of his survey of copper deposits on the eastern side of the South Urals. The survey covered a distance of over 400 km. from the upper course of the river Uy south of Zlatoust in the south to the region of Nizhnyi Tagil in the north and within this area were about 15 sites in which traces were found of exploitation of copper ores and their smelting on the spot. According to E. E. Kuzmina (*AO* 1969, 393 f.) traces of copper smelting have been discovered in the settlement of the Andronovo culture at Chernorechie I on the river

Ushkatta (district Dombarovskii, oblast of Orenburg). The malachite ore there reaches to the surface of the ground.

Exploitation of copper ores and the smelting of copper on the spot by the peoples of the Tagarskaya culture in the 7th to 6th centuries B.C. have been recorded on several sites in Khakassia, west of the middle Yenisey. Settlements of ancient metallurgists found there have been reported by Ia. I. Sunchugashev (*AO* 1967, 177; 1968, 231; 1972, 240f; *SA* 1970-3, 181-186) at Temir, district of Ust-Abakan; near the mountain of Temir Dag at Ulus Uzun-Zhul, district of Askiz; at Mokryi Tarban, 7 km. south of Ulen; and at some other sites. The date of a smelting oven found on the river Kiug, a left tributary of the Askiz, has been established by sherds of the Karasuk pottery. Two iron forge-pits of the Tashtyk period were found at Kyzlas and, in the region of Chornoe Ozero, ten iron forge-pits were investigated and some at Podkamen in the same area (*AO* 1973, 224), all of the Tashtyk period.

Sites with traces of ancient copper mines, some connected with copper smelting and one with traces of tin metallurgy (at Mongun) and sites with remains of iron forge-pits have also been found in Tuva and its neighbouring regions of Khakassia further north (Ia. I. Sunchugashev, *KSIAM* 107, 1966, 54-56; *AO* 1969, 203 f.; 1970, 205 [jointly with V. D. Shirokushkin]; 1971, 382 f.). The earlier of these belonged to the people of the Tagarskaya culture and the later ones to the people of the Tashtyk period. M. A. Devlet (*SA* 1968 1, 28-38) discusses the date of the introduction of iron metallurgy into the country on the middle Yenisey and does not agree with N. L. Chlenova, according to whom it took place in the two last centuries B.C., and who considers that iron articles representing earlier types found in that area must have been imported from other regions. Devlet is of the opinion that iron metallurgy was introduced in the country not later than in the 5th century B.C., at the transition from the Tagarskii to Tashtyk periods, when bronze had been entirely superseded by iron for the manufacture of weapons and tools.

Art and beliefs

A few books published by S. I. Rudenko since 1960 are of importance for the study and the knowledge of the Siberian art of the 'Scythian' and its subsequent periods. One of these, *Kultura naseleniya Tsentralnogo Altaya v Skifskoe vremya* (*The Culture of the Population of Central Altai in the Scythian Age*, Moscow-Leningrad 1960, 360 pages, 126 plates, 13 of these coloured, 146 figures in text) has recently appeared in English under the title *Frozen Tombs of Siberia* (London 1970, 340 pages, 147 half-tone and 33 coloured plates), translated with slight alterations and provided with a long introduction by M. W. Thompson. It mainly concentrates on the description of the royal and princely barrow graves in the High Altai Mountains and on showing the magnificent art of their contents. Another book by the same author *Iskusstvo Altaya i Peredney Azii - Seredina I tysiacheletiya do n.e.* (*The Art of Altai and of Hither Asia - the mid-first Millennium B.C.*, Moscow 1961, 69 pages, 18 plates) contains a brief review of the development of the West-Asiatic art in the 3rd and 2nd millennia B.C. but is devoted chiefly to the art of the Altai tribes as revealed by excavation of the Pazyryk group of burials and similar ones in that area. The West Asiatic elements in this art have been emphasized.

Another contribution by S. I. Rudenko to the knowledge of the art of Siberian nomads of the 1st millennium B.C. is his work *Sibirskaya kollektsiya Petra I* (*Siberian Collection of Peter I*, SVOD D-3-9, Moscow-Leningrad 1962, 52 pages XXVI plates). It contains a detailed description of all items of the Collection of Peter I and their position as examples of Scythian art in general. According to the author, the bulk of articles in the Collection were of the 6th to 4th centuries B.C. with some items being of somewhat later date, up to the 2nd century A.D. He considers that most originated from the richly endowed princely burials of the steppe nomads of Siberia and Kazakhstan. However, gold ornaments of the same type and made in the same technique as the specimens in the Collection looked upon as of the 6th to 4th centuries B.C. have quite recently been excavated in Sarmatian barrow graves on the lower Volga and in the Ukraine of the period from the 2nd century B.C. to mid-first century A.D. (for instance at Kalinovka and Verkhnee Pogromnoe, both on the lower Volga and in the gold hoard from Largutse in Bessarabia, etc. (see my *The Sarmatians*, 1970, 120, pl. 30, 35 and the literature quoted there). These finds point to a later date for Siberian items. A. P. Mantsevich (*AK* 1973-8, 9-27) raises doubts about whether the specimens in question in the Siberian Collection were of Siberian origin; she points out that analogous articles may be found in the North-west Caucasus and in the countries on the lower Danube. On the other hand, a bronze plaque in open-work recently found in a barrow grave of the Scythian Age (6th to 3rd centuries B.C.) at Urbiun in central Tuva implies that the question of the origin of the relevant items of the Collection is more complex. The plaque (D. G. Savinov, *KSIAM* 119, 1969, 104-108) represents a combat between a tiger and an eagle-griffin and has been executed in the same style and manner as were similar plaques of the Collection.

V. F. Shteyn (*SAS* 2, 1966, 259-266) discusses the thin gold plaques of a special design that have to be sewn on garments, several of which form part of the Collection of Peter I in the Hermitage Museum, Leningrad. In the central part of their surface a figure of an animal is placed to which different names have been given by various authors, 'the phantastic animal', 'the boar', etc. V. F. Shteyn points out that in fact the figure represents a badger, which is attested by the serpent wound round the animal (badgers being well known as destroyers of serpents). The Altai origin of the plaques is suggested by both the circumstance that these are made of electron which in its natural state has been mined in the Altai country and by the fact that the serpents depicted on the plaques evidently represent a local Altai species.

The origin of the Scythian animal style has been discussed by N. L. Chlenova (*MIA* 177, 1971, 208-217) and attention drawn to the fact that the main motifs of the Scythian art represent animals of southern origin, entirely alien to the Asiatic and European forest zone. A similar situation relates to the art of the Tagarskaya, Karasuk and Seima-Turbino cultures. Furthermore the primary material in which the earliest artifacts of the art of the latter group were made was metal, not wood, antler or bone, as could be expected. A similar conclusion has been reached by G. A. Pugachenkova (*SA* 1959-2, 70-84) who has discussed the motif of griffins in the art of ancient and medieval peoples of Soviet Central Asia; she points out that the earliest examples of this motif may

be found in Western Asia as early as the 3rd millennium B.C. and in its fully developed form it appears in the Achaemenid art of the 6th to 4th centuries B.C., whereas in Khoresmia it has been recorded only in the 5th to 4th centuries B.C. She also discusses the further development and transformation of this motif in later periods. Recent literature on topics related to Scythian art was quoted in my earlier report (*Bulletin* 10, 1972, 110 f.).

Close connections between the art of the Tagarskaya tribes and Western Asiatic art have been discussed by M. A. Devlet (*MLA* 130, 1965, 240-242) who has stressed that the motifs of fantastic animals, birds, etc. which appear on fabrics in barrow graves of the Altai Pazyryk group and on Siberian petroglyphs were obviously adopted from Western Asiatic art.

The petroglyphs were not the only means of expression of the artistic perceptions of the peoples of the Siberian Forest and mountain zones during the period under review. Of interest is a burial of the Tashtyk culture of the 3rd to 5th centuries A.D., investigated by M. P. Griaznov (*ASE* 13, 1971, 94-106) in the region of Tepsey Mountain on the upper Yenissey. A man was buried there in a kind of box of planks which was then set on fire and subsequently a small earthen mound was raised over it. The charred planks, which survived, were covered with engravings described by the author.

Anthropomorphic representations incised on clay vessels were quite common in the Samus IV culture in the region of Tomsk and also on the Yenissey and in the Khakassia-Minusinsk basin, frequently with solar and other signs associated. These were described and their similarity to analogous representations in other regions discussed by E. V. Vadetskaya (*SA* 1969-1, 270-274). The same author (*KSIAM* 128, 1971, 33-36) also discusses the meaning of the upright 'memorial stones' or stelae found in many Tashtyk cemeteries, always on the edge of a 'stone enclosure' (*ograda*), in particular in the region of Uybatskii Chaatas on the river Uybata. Stone stelae of the 7th to 12th centuries A.D. found in the region on the upper Irtysh have been described and classified by F. Kh. Arslanova and A. A. Charikov (*SA* 1974-3, 220-235).

Some religious or magic beliefs undoubtedly underlay all the petroglyphs and other objects mentioned above, especially those variously decorated. To the same category belong articles which may be regarded as kinds of amulets, in particular the so-called 'whetstones' currently found in Sarmatian graves of that time. They bear traces of having been worn for a long period but show no traces of having been used as whetstones to sharpen knives or weapons; they must, therefore, be considered as amulets (M. P. Graiznov, *AF* 1961, 139-144). Here also must come bronze pendants or amulets in the shape of a composite bow, some with a gorytus in which they were put. They undoubtedly had a magic purpose for protecting the bearer (M. A. Devlet, *KSIAM* 107, 1966, 70-74). In the same category come bronze pendants or amulets reminiscent of an ox-yoke, discussed by M. D. Khlobystina (*SA* 1970-3, 186-193); she thinks that they may represent a schematic imitation of ibex horns and were closely connected with shaman beliefs and practices. They appear mainly in the remains of the Karasuk culture, and during the Tagarskaya and Tashtyk periods they underwent a progressive schematisation.

Their origins go back to ancient cults and magical practices of the Minusinsk tribes in the early 2nd millennium B.C. Traces of a gloomy practice of another kind have been discovered at Miaskoe near Cheliabinsk in the South Urals, as reported by V. F. Gening (with two associates, *AO* 1968, 151 f.). In a grave under a barrow of the Early Iron Age, a clay vessel which contained a human skull stood near the feet of the burial that lay in a wooden trunk. In this context an article by A. Rieth (*Præhistorische Zeitschrift* 49-1, 1974, 62-81) deserves mention. It deals with burial masks of the Tagarskaya and Tashtyk cultures, which are their very specific features. This theme does not seem to have been discussed in the Soviet literature of the period dealt with here.

Mention should be made of the article by M. P. Griaznov (*ASE* 3, 1961, 3-31) devoted to the topics connected with the earliest heroic epics of the peoples of South Siberia. After a long discourse, the author concludes that the earliest theme of the heroic epics of the Early Nomads, as may be deduced from the scenes depicted on the plaques of the Peter I Collection, exhibits many elements in common with the epics of the modern Turcic-Mongolian peoples; at the same time, however, the latter considerably differ from the ancient ones.

Petroglyphs

The petroglyphs, paintings or engravings on rocks and/or large stones in the river valleys of the Altai, Sayan and other mountains, mostly at a considerable altitude, form the largest group of art exhibits in the area under review. Over the Tien-Shan and Pamir Mountains they extend further south to the confines of Soviet Central Asia. Several groups of newly discovered petroglyphs and the special studies devoted to them have been quoted in my previous reports (*Bulletins* 7, 1968, 52f.; 8-9, 1970, 122f.; 10, 1972, 110-112).

Presumably the petroglyphs were for the most part a kind of religious art closely connected with specific beliefs and magical rites. Their age ranges from about the 7th century B.C. to almost the present. Their geographical extent within the whole territory of Soviet Asia is well illustrated by a map published by A. P. Okladnikov in his book (in German) *Der Hirsch mit dem goldenen Geweih* (*The Stag with a Golden Antler*, Wiesbaden 1973, 184 pages, 45 figures, 32 plates), although the actual number of sites with petroglyphs far exceeds those quoted and described in this book. This is well demonstrated by brief reports by Ia. A. Sher and his three associates (*AO* 1968, 180 ff.; 1969, 178 f.) in which classification and establishment of the chronology has been attempted of over 2,000 rock paintings and incised drawings recorded at Oglakhty I, III, Tepsey III, IV and Ust-Tuba VI, all north of Minusinsk, in the region of the junction of the Tuba with the Yenisey. Some of these petroglyphs bear an apparent similarity to the art of the Altai Pazyryk burials and attest to the connections between the Tagarskaya tribes with those of the Altai.

More petroglyphs have been reported from the Sayan Mountains mostly in the valley (gorge) of the upper Yenisey, e.g. at Mugur-Sargol by G. V. Dluzhevskaya (*AO* 1973, 199 f.) and on the river up to the junction of the Khemchik with the Yenisey in Tuva (S.

G. Klashtornyi and Ia. A. Sher, *AO* 1971, 242 f.), and in Central Tuva at several sites in the region of Kyzyl (M. A. Devlet, with two associates, *AO* 1973, 202 f.). Petroglyphs typical of the period from the 7th to 1st centuries B.C. have been found by M. Kh. Mannay-Ool (*AO* 1967, 144) on the river Irbitey in the district of Oviurskii where 'stag stones' were also found.

Petroglyphs considered to be of the 5th to 3rd centuries B.C. and those of a later date have been recorded by P. P. Khoroshikh (*AO* 1968, 233-235) on the Sakhyurt Mountains on the left bank of the Anga, an affluent of the Baikal Sea. In the same regions petroglyphs were reported by A. P. Okladnikov (*AO* 1971, 277 f.) found on the upper Lena between Kachug and Ust-Ilgii.

In the Amur oblast, as reported by A. I. Mazin (*AO* 1968, 211 f.) petroglyphs were found in some thirty points about 70 km. down the river Amur from Ust-Urkina and in the valley of the Niukzha in the north-west of the province. Petroglyphs were also found north of these, in Yakutia, in the valleys of the Olenek and the Viliuy as reported by N. D. Arkhipov (*AO* 1970, 195 ff.). The north-easternmost petroglyphs were recorded by N. N. Dikov (*AO* 1968, 218 f.) on the river Kaykuul, in the valley of the Pegtymel at the foot of the Anadyr Mountains; a neolithic site has been found nearby to which presumably the petroglyphs belonged.

A series of special works by A. P. Okladnikov, some published jointly with another scholar, have been devoted to the description, characteristics and appreciation of petroglyphs recorded in various parts of Siberia east of the Yenisey and the Baikal Sea. One of these, *Petroglify Angary (Petroglyphs of Angara)*, Moscow-Leningrad 1966, 332 pages, including 178 tables) gives a brief description of, and dates for, the petroglyphs of the area arranged according to their division into groups in the river valleys. In a similar way petroglyphs of the region farther to the east were dealt with in the book by A. P. Okladnikov and V. D. Zaporozhskaya, *Petroglify Sredney Leny (Petroglyphs of Middle Lena)*, Leningrad 1972, 272 pages, including 165 plates, with summary in English). Another published by the same two scholars is *Petroglify Zabaykala (Petroglyphs of the Transbaikal Country)*, 2 vols., Leningrad 1969, 218 pages, 113 plates; 1970, 264 pages, 91 plates). The petroglyphs in the easternmost region have been dealt with by A. P. Okladnikov alone *Petroglify Nizhnego Amura (Petroglyphs of the Lower Amur)*, Leningrad 1971, 336 pages, 196 plates). However, a single volume of this series, the finest of all, by A. P. Okladnikov jointly with A. I. Martynov, *Sokrovishcha Tomskikh pisanits (The Treasure Trove of Tom Petroglyphs)*, Moscow 1972, 258 pages, 38 half-tone plates; a summary in English), beside publishing the petroglyphs of the river Tom, a tributary of the Ob, contains also a large series of line-drawings showing as comparative material various bronze and bone figures of the Tagarskaya and other prehistoric cultures, and also modern shaman representation.

Western Siberia

The Sverdlovsk oblast extending over the Middle Urals east of the mountains from the geographic point of view lies in Siberia, although administratively it is considered as a

province of the European part of the Soviet Union. There at Koksharovo I 70 km. north-east of Nizhnyi Tagil a stratified settlement was investigated by V. F. Starkov (*SA* 1970-1, 97-108). Three occupation layers have been distinguished there of the Neolithic, Eneolithic and the Bronze Age and these have been characterized briefly by the author. Mention should also be made of the excavation and investigation by V. E. Stolyarov (*KSIAM* 119, 1969, 52-61) of a number of settlements and earthworks of the Early Iron Age in the basin of the Isset, a left tributary of the Tobol south-east of Sverdlovsk. Some of these lay in the oblast of Sverdlovsk but most lay within the Siberian oblast of Kurgan and some still further east. They were described and classified into a few chronological-typological groups. A sketch map in the text gives the position of these settlements and earthworks, 18 in all. A stratified settlement was investigated by T. M. Potemkina (*AO* 1971, 284 f.) at Yazevo on the river Tobol in the oblast of Kurgan. Its earliest layer was Andronovian, the next of the 10th century B.C. and the upper stratum was of the second part of the first millennium B.C. A few mounds of the barrow grave cemetery that belonged to this settlement was also excavated and they were of the period from the 15th to 13th centuries B.C.

Of interest is a find from the earthwork of Pyaksimovola on the left bank of the river Severnaya Sosva, a left tributary of the lower Ob, situated on the upper course of that river in the Northern Urals. The find consisted of two thin silver covers of phalerae, covered with a bossed geometric ornament of the same kind as that typical of the phalerae of the end of the 1st century B.C. (V. I. Moshinskaya, *MIA* 130, 1965, 237-240). The covers were undoubtedly brought to the north from the steppe and they attest to connections of the region on the lower Ob with the southern steppe country.

A few sites were investigated in the oblast of Tiumen. There are accounts by V. D. Viktorova, jointly with two other scholars of investigations of the sites around Lake Andreevskoe, 18 km. south-east of Tiumen (*AO* 1969, 190; 1970, 198 f.; 1972, 204). A few neolithic and Bronze Age sites were recorded and some were investigated. An earthwork built in the Early Iron Age called Andreevskoe No. 5 and another at Ivanovka on the Irtysh in the district of Tobolsk were excavated. In the latter two layers of occupation have been established, the earlier one of the end of the first millennium B.C. and the early first millennium A.D., the second of the period from the 4th to 7th centuries A.D.

About 70 to 80 km. south-east of Tiumen in the steppe region near the junction of the Isset with the Tobol, several groups of Sarmatian barrow graves have been recorded by P. M. Kozin (*MIA* 153, 1972, 79-86). In each group the few large mounds were all dug, probably by treasure-seekers, and it seems very likely that several items of the Peter I Collection might have originated from these burials. The author describes the results of these investigations and comments on them. Burials were mostly of the 4th to 3rd centuries B.C. Finally there is a report of an excavation of an earthwork at Likhachevo near Tiumen by V. F. Gening (*AO* 1966, 102-106) considered to have been one of the earliest in that part of the country.

East of the sites mentioned above but still in the Tiumen oblast, in the region of the

river Ishim has been covered by a survey and excavations reported on by M. G. Moshkova and V. F. Gening (*MIA* 153, 1972, 87-118). There, near Abatskoe on the left bank of the Ishim, some 60 km. east of the small town of Ishim, two groups of barrow graves were found at a distance of about 12 km. from the village. Many were destroyed by bulldozers and only two larger ones were entirely excavated by the authors. There were several secondary burials in each mound. The barrows were of the period from the 3rd century B.C. to the 1st century A.D. Their plans and the description of all grave goods were published by the authors. In the country around many settlements have also been recorded of the time from the 2nd century B.C. to approximately the 2nd century A.D. Pottery found in settlements was very similar to that excavated in barrow graves.

Worthy of attention are the results of a survey in the northern part of the Tiumen oblast published by V. P. Viktorov and N. G. Smirnov (*AO* 1973, 188 f.) where 58 earthworks have been recorded mostly in the valley of the Ob, some at a distance from the river valley. A trench dug across one of these, the Barsov Gorodok II/8 earthwork, revealed that it was constructed at the beginning of the 1st millennium B.C. and perished in a conflagration. Around the earthwork about 20 agglomerations-villages with up to 35 dwellings each have been recorded.

Still more intensively surveyed and investigated was the country extending further east, on the middle Irtysh, the Omsk oblast. There is a report by V. F. Gening (*AO* 1967, 139 f.) on the results of the excavation of 'subterranean corridors' discovered at a depth of up to 5m. at Chernoozerie, district of Sargatskoe, about 140 km. north of Omsk, on the left bank of the Irtysh. Burials of the mid-first millennium A.D. have been found in these and deformed skulls excavated there suggest that these were Hunnic burials; no similar burials have been found in any part of Siberia. In a joint report by the same author with seven associates (*AO* 1969, 187-189) an investigation of several sites in the same region the dates of which range from the Palaeolithic to the Neolithic have been reported. In Point III an Early Bronze Age encampment, a flat cemetery of the Bronze Age and a barrow grave cemetery of the Early Iron Age were investigated; and in Point VIII a settlement of the Bronze Age. According to V. P. Viktorov (*AO* 1970, 197 f., with five associates) in the following year a Late Bronze Age earthwork at Chernoozerie I, an earthwork at site V and a late Andronovo-Karasuk earthwork at site VIII were investigated. Two more earthworks were investigated in the neighbouring village of Inderen, one of the Andronovo culture at Point IV, the other of the Karasuk period at Point VI. In the latter village also an Early Iron Age barrow grave was excavated.

In the years 1967-1972 intensive excavations were conducted by V. A. Mogilnikov mainly in the region north of Omsk, the country within the forest-steppe zone which was hitherto very little investigated, although the ancient tribes which lived there during the Early Iron Age had played a considerable role in the formation of modern Ugrian and Turcic peoples of Western Siberia, as emphasized by this scholar. The first to be investigated was the barrow grave cemetery at Kokonovka, 35 km. north of Omsk, on the right bank of the Irtysh (V. A. Mogilnikov, *AO* 1967, 141 f.; and two articles in *MIA* 153, 1972, 119-133 and 134-149); It was of the 4th to 3rd centuries B.C. and its graves, both

primary and secondary, were for the most part looted. A detailed description of the excavated mounds, their plans and illustrations have been published by the above author in *MIA* 153, 1972. In the same publication there is also a larger report provided with plans and illustrations of the barrow graves investigated at the same time at Sargatka, a village situated in the vicinity of Kokonovka, but on the other side of the Irtysh; it dated from the 2nd century B.C. to the 1st century A.D. At Kokonovka a few huts were also excavated in the settlement of the 4th to 3rd centuries B.C. It is of interest to note that Carbon 14 determination of the barrow grave 10 at Kokonovka suggests its date around the turn of the Christian Era (LE 787), whereas V. A. Mogilnikov dated it to the 4th to 3rd centuries B.C. The author also discusses the connections with the people buried in the region of Omsk and points to their similarity to those on the Ishim further west. The distance of about 500 km. separates the barrow grave cemeteries of Kokonovka and Sargatka from those at Abatskoe on the Ishim described above.

In a series of other reports, V. A. Mogilnikov gives account of his investigation of several more sites in the country north of Omsk (*AO* 1968, 228 f.; 1969, 206 f.; 1970, 210 f.; 1971, 278-280). One of these was the earthwork at Strizhevo, district of Nizhne Omskii, of the Sargatskoe culture to which also the earthwork at Kushaly belonged; a barrow grave cemetery nearby was its burial ground. The earthwork at Speranovka on the right bank of the Om, about 10 km. east of Omsk, was of the Middle Irtysh culture (M. A. Mogilnikov, *KSIAM* 128, 1971, 48-52). It was dated from the 3rd century B.C. to the early 1st century A.D. A few flat and barrow grave cemeteries were also investigated; at Gornaya Bitiya, where three mounds of the 3rd to 2nd centuries were excavated; one barrow grave at Okunev on the Tara of the 6th to 5th centuries B.C., in which a bronze knife typical of the Scian culture of Central Asia was found; on the river Tara, where settlements and earthworks of the Sargatskoe culture of the 5th to 4th centuries B.C. were recorded. At Setkulovo, district of Muromtsevskii, a barrow grave was investigated in which pottery of the lower Ob type was found, making this the southernmost find of this type known so far. Another important find from this grave was glass beads of Mediterranean origin and Central Asiatic carnelian beads, implying southern connections with the country around Omsk.

As mentioned above the main excavations reported by V. A. Okladnikov were conducted at Bogdanovka (district of Gorkovskii) on the right bank of the Irtysh, about 100 km. north of Omsk and there is a recent further report on these by A. V. Zakharova, jointly with her three associates (*AO* 1973, 203). An earthwork and a barrow grave cemetery were investigated. In the mounds of the latter, several of which were excavated, there were usually several secondary burials, all of the period from the 3rd to 1st centuries B.C., many of which had been looted. Many grave goods, like those from barrow A, consisted of articles of Central Asiatic origin or were modelled on Central Asiatic examples implying southern connections, as do the burials mentioned above. V. A. Mogilnikov thinks that the earthwork at Bogdanovka, in which similar articles of southern origin were excavated, was the main centre of the Sargatskoe culture during the Early Iron Age, around the turn of the Christian Era.

Finally, at Rostovka near Omsk, on the left bank of the Om close to its junction with the Irtysh, V. I. Matiushchenko has investigated a 'flat' cemetery (*AO* 1967, 143 f.; *KSIAM* 123, 1970, 103-105). This contained 30 graves of the Seima-Turbino (or Samus) type of the Bronze Age. Some skeletons were partly cremated, and in a few cases a secondary interment took place after the corpse had decayed elsewhere. Socketed bronze axes and other goods, in particular a bronze knife of the Seima-Turbino type attest to the Samus stage of the Bronze Age. The knife had a small figurine of a man with his horse on the top of the handle.

Two articles which deal with some general questions relating to West Siberia deserve attention. One of these by M. F. Kosarev (*SA* 1972-4, 19-27) concerns the reasons and social consequences of ancient tribal migrations in western Siberia. Kosarev concludes that the main cause of migrations was different rates in the development of productive forces in various parts of the area and the consequent increase or decrease in the density of population; other causes might have been climatic changes or other natural causes. The outcome was tribal migrations, wars, assimilation of groups of population, etc. In another article (*AO* 1973, 209) the same author briefly presents the results of his study of the changes in the water level of a number of lakes in the basin of the Iska, a tributary of the Tobol north of Tiumen, and their impact on the habitat and economy of the population of six settlements on the shore of those lakes during the time from the Neolithic to the Early Iron Age. He points out that during the Neolithic the water level was higher, the climate much milder and consequently the country offered splendid chances for fishing.

The other article by M. S. Akimova (*MIA* 153, 1972, 150-159) is devoted to the anthropological study of the population of Transural country and West Siberia during the Early Iron Age, based on the material from ten cemeteries of the second half of the first millennium B.C. of the whole area mentioned above. The author concludes that the population of the area was mixed; its basic element was the Europoidal type related to the Andronovo type, and another element, possibly the primary local one, was of the same type as that of the forest zone dwellers of West Siberia. The population of the basins of the Ishim and the Irtysh represented a single anthropological type, and differed from that of the basin of the Iset.

Central Siberia

In the oblast of Tomsk intensive archaeological activity was conducted mainly in three areas. One of these lay in the northern part of the province which has been called 'Narymskie Priobie'; it extends along the middle course of the Ob. There, at Stepanovka, near the town of Noviy Vasiugan on the river of that name, two settlements and an earthwork were investigated (L. A. Chindina, *AO* 1971, 268-272; 1973, 232 f.), all of the time about the turn of the Christian Era. In the remains of each of these, besides pottery, traces of bronze casting, copper slag, drops, crucibles were found. Of interest was a flat human figurine cast in a one-sided mould found in settlement I and fragments of a few bronze figurines representing some fantastic beings. In a special article by the same author (*SA* 1970-1, 248-254) pottery of a particular type excavated in the cemetery Relka on the middle Ob was considered.

Other recorded and partly investigated sites were reported on by Iu. F. Kuryushin (*AO* 1971, 282; 1972, 217; 1973, 207) including a settlement near the town of Manget of Lake Krugloe, which had several occupation layers from the Neolithic to the mid-first millennium A.D.; the earthwork Sarovskie situated south of the town of Kopashevo; and a few settlements and earthworks in the region of Ozerne-Vasiugan and near the junction of the Savelevka with the Kenga, all of the Late Bronze Age and the first half of the first millennium B.C.

An attempt has been made by M. F. Kosarev to reconstruct the changes that occurred in the country on the Ob early in the first millennium B.C. (*KSIAM* 119, 1969, 43-51). Within the area between the rivers Ob and Irtysh two main cultures had developed during the 2nd millennium B.C., the 'Andronovoid' Tobol-Irtysh culture in the forest-steppe zone, and the autochthonous Tomsk-Narym culture, called also the Samus culture, in the forest zone. A gradual extension northwards of the forest-steppe zone caused by changing climatic conditions attested by the palaeobotanic studies, resulted in a gradual migration by the end of the 2nd millennium of a large part of the population of the forest-steppe zone northwards into the southern part of the Tomsk-Narym taiga. The outcome of this process was the formation in the latter area of a hybrid 'Andronovoid' culture, the economy of which was based on pasturage and agriculture; the newcomers gradually assimilated the native population, and the beginning of the process of this transformation marks the beginning of the formation of the Kulayskaya culture, the bearers of which undoubtedly were the ancestors of the modern Ugro-Samoyed peoples.

Another area investigated lay in the region of the Narym, near the junction of the Parabel with the Ob, west of the latter river. The earthwork of Basandayskie was investigated by L. M. Pletneva (*AO* 1970, 211 f.) and proved to have three occupation layers, a Neolithic one, the 1st century B.C. and the end of the first millennium A.D. At Chuzik on Lake Chuzik and at Nalimach near Prokop a few settlements of the Early Iron Age of the 1st millennium A.D. were partly investigated.

The third Central Siberian area investigated extends around Tomsk. Accounts of the investigation of cemeteries of the Andronovo culture at Elovka and Rostovka by V. O. Matiushchenko (*AO* 1967, 143 f.; 1968, 196 f.; 1969, 191 f.; 1970, 200 f.) show that both were mainly dated to the end of the 2nd millennium B.C. but that they also included burials of the early 1st millennium B.C. Reports by this author include also the results of excavation of the Bronze Age settlement of Samus IV. Excavation of the settlement of Samus II, situated on the river Samuska about 40 km. north of Tomsk, was the theme of a brief report by L. M. Startseva (*SAS* 2, 1966, 208-211) showing that the settlement was in existence from the 5th-4th centuries B.C. until the 1st century A.D., during the second period of the Tagarskaya culture (the Biiski period), the least investigated so far and the earliest period of the Iron Age of the forest zone. According to V. A. Posrednikov (*SA* 1972-4, 28-41) Samus IV was one of the most important Bronze Age settlements in West Siberia. In its remains two main elements are clearly distinguishable, one being the neolithic element of the upper Ob and the other the forest zone element, which in the country on the Ob was of an earlier age than the remains of

the Elovo-Dessiatovo type there; the latter were of the end of the 2nd millennium B.C. and mark the beginning of the Elovo culture in that area.

Several settlements and cemeteries were investigated further south, in the Novosibirsk oblast, and the results published in brief reports, chiefly by I. N. Troitskaya (AO 1968, 201 f.; 1969, 199 f.; 1970, 192-194; 1971, 249 f.; 1972, 242 f.; 1973, 227 f., with four associates). Thus at Staraya Preobrazhenka on the Om, district of Chanovskii, a few, mostly ransacked, barrow graves were excavated; some were of the Andronovo culture of the Late Bronze Age but most were of later periods, up to the 9th century A.D. I have already reported on the investigation of an earthwork and settlement at Zavaylovo on the 'Ob Sea' (water reservoir) (*Bulletin* 8-9, 1970, 141). Other investigations included a settlement of the 3rd to 2nd centuries B.C. at Dubrovinskii Borek; a settlement of the 5th to 4th centuries with pottery of the Biiski type, and a barrow grave cemetery of the time from the Neolithic to the Early Iron Age at Ordynskoe; an earthwork of the early 1st millennium A.D. at Chernyi Mys on the Uen, district of Kolyvanskii, and a number of barrow graves there; in the latter mounds several secondary burials were uncovered. In the earliest barrow grave, of the 3rd and 2nd centuries B.C., iron weapons and glass beads of southern origin were found; the latest secondary burials were of the 1st and 2nd centuries A.D. Grave goods in this cemetery imply that the ancient Bolsherechenskaya culture of the area has been replaced by that of the Ust-Poluy type proper to the forest zone. A mound there called the 'Long Barrow' (Dlugii Kurgan) yielded 32 burials of the period from the late Neolithic to the end of the Bronze Age; pottery in these burials was of the Berezovka stage of the Bolsherechenskaya culture.

The circumstances connected with the replacement by the end of the first millennium B.C. in the Novosibirsk country of the local ancient Bolsherechenskaya Culture by the newcomers from the Tomsk-Naryn taiga, the country on the Ob north of Tomsk, has been discussed in a special article by I. N. Troitskaya (SA 1974-3, 45-55). Finally, mention may also be made of a report by the same author (SA 1970-3, 213-217) of the excavation of a barrow grave cemetery of the 5th to 4th centuries B.C. at Novyi Sharap on the Ob. It was of the Biisk stage of the Bolsherechenskaya culture. Of interest was a partly ransacked burial of a warrior buried with his iron weapons. A decorative plaque found there was typical of the Tagarskaya culture of the 5th century B.C.; this was the earliest article of that culture found in the country on the Ob and further west.

Investigations of barrow grave cemeteries and settlements in the Kemerovo oblast have been reported by several scholars. One such, A. I. Martynov (AO 1969, 195-197; 1970, 294 f.; 1971, 292 f.) gives account of excavation of barrow grave cemeteries of the Tagarskaya and early Tashtyk cultures at Serebriakovskii, at Nekrasovo (a chamber under a mound with 34 burials of the 4th to 3rd centuries B.C. of the Tagarskaya culture) and of settlements at Shestakovskoe on the Kiya (the end of the Tagarskaya and the Tashtyk culture, the 3rd to 1st centuries B.C.). A stratified settlement in Utinka district of Tisulskii was investigated (A. M. Kelenzhin, AO 1970, 213 f.) and also that at Kamenka in the Uriup district of Tiazhinskii; both were of the transitional period from the Tagarskaya to Tashtyk cultures. A settlement of the Tashtyk culture of the beginning of

the Christian Era at Mikhailovka on the Kiya, district of Chebulinskii, was also excavated by G. C. Martynova (*AO* 1967, 168).

Of interest are Carbon 14 determinations of three burials in barrow graves at Yagunya, investigated by I. A. Martynov in the Kemerovo oblast (*SA* 1969-1, 41 and 260). Barrow grave 6, burial 3: 330 ± 120 B.C. (LE-399) was considered to be of the 6th to 4th century B.C.; barrow grave 7, burial 2: 20 ± 60 B.C. (LE-505) was considered to be of the second stage of the Tagarskaya culture; barrow grave 5, burial 1: 430 ± 100 A.D. (LE-553) was considered, as the above, to be of the Tagarskaya period.

An account of the excavation of a number of barrow graves in the vicinity of the town Biisk (Biisk I and Biisk II) in the province of 'Altaiskii Kray' (Altai country) bordering on the Novosibirsk oblast to the south has been given by M. P. Zavitukhina (*ASE* 3, 1961, 89-108). The cemeteries lay in the submontane steppe country of the Central Altai Mountains and belonged to the 'Early Nomads'. Their grave goods show many features in common with those of the Bolsherechenskaya culture characteristic of the afforested zone further west (*Bulletin* 8-9, 1970, 141) but at the same time many features link the Biisk barrows with those of Tuva. The author dates the Biisk I cemetery to the period from the 2nd century B.C. to the 1st century A.D. In another article M. P. Zavitukhina (*ASE* 8, 1966, 61-77) publishes the report of S. M. Sergeev on the excavation in 1930 and 1935 of fifteen barrow graves at Bystryanskoe in the same area as the cemetery above and comments on their grave goods. The cemetery was of the period from the 5th to 1st century B.C.

Investigations in the district of Ust-Pristanskaya on the western side of the river Ob, have been reported by N. L. Chlenova (*AO* 1969, 200 f.; 1970, 212 f.; 1973, 233), and there, already within the confines of the Bolsherechenskaya culture, several settlements were recorded and the earthwork of the 7th to 5th centuries B.C. has been excavated at Surtayka, about 50 km. southeast of Biisk. Twenty-five Karasuk and 'Scythian' barrow graves at Surtayka and Kamyshehenka were excavated (N. L. Chlenova, *KSIAM* 134, 1973, 114-121).

Finally, the stray articles of the Scytho-Sarmatian period and type found in the steppes of the 'Altai country' east of the upper Ob have been described by A. P. Umanskii (*SA* 1970-2, 169-179). Most of these articles, bronze arrow-heads, daggers, swords, buckles, bits etc. represent types common in the East Kazakhstan barrow graves.

In the oblast of Krasnoyarsk, excavations and investigations were undertaken at several points. In the west of the province they concentrated in the forest-steppe zone in the region of the town Achinsk, over 150 km. west of Krasnoyarsk. There fourteen barrow graves of the Tagarskaya culture were excavated (A. I. Martynov, *AO* 1967, 167 f.), and it was found that their construction exhibited a strong influence of the Altai people and the Sarmatians of the 4th century B.C. In the same region a stratified settlement was excavated at Belyi Yar in which, according to A. V. Tsirkin (*AO* 1971, 291 f.; 1972, 247 f.), pottery of the 2nd and 1st centuries B.C. was found; but pit-dwellings in another part of the site yielded pottery of the Tashtyk period of the 2nd to 4th centuries A.D. At Krasnoe on the Tom a large settlement was investigated of the period from the 2nd century B.C. to the early centuries of the Christian Era.

The results of the investigation of barrow grave II of a larger group of mounds at Korkino on the Yenisey in the environs of Krasnoyarsk have been published by R. V. Nikolaev (*SAS* 2, 1966, 196-207); it contained nine burials; the skulls were mostly trepanned. Burials were mainly of the Tagarskaya culture of the early 5th century B.C. but in their burial ritual they exhibit many features characteristic of the subsequent Tashtyk period. Elements borrowed from the neighbouring Khakass-Minusinsk centre can easily be distinguished.

In the area south of Krasnoyarsk in the region of the water reservoir built on the Yenisey called the 'Krasnoyarsk Sea', several cemeteries of the Karasuk and Tagarskaya periods were investigated; they contained many barrow graves and also 'ogrody', enclosures fenced by upright stone-slabs. They have been described and their contents discussed by G. A. Maksimenkov and M. V. Issaeva (*AO* 1972, 226 f.) and also by M. P. Griaznov and G. A. Maksimenkov (*AO* 1971, 248 f.). The sites investigated lay near the Afansievo Mountain, on the river Chervonaya, on the junction of the Tuba with the Yenisey, on the Lake Sukhoe, and in other places.

North of Krasnoyarsk, on the river Podkamennaya Tunguska (or Upper Tunguska), especially in the area near its junction with the Yenisey, many socketed axes, decorated bronze discs and other bronze articles were found; they were mostly of the 1st millennium B.C. and their significance has been reviewed by G. I. Andreev (*KSIAM* 128, 1971, 44-47). The study of the decorative socketed bronze axes (with no loop) of the 6th to 3rd centuries B.C. found in the area on the river Krasnoyarskaya Angara has also been dealt with by G. A. Maksimenkov (*SA* 1960-1, 148-162).

Investigations undertaken in the north of Siberia on the Taimyr Peninsula in the basins of the rivers Pyasina and Kheta Katanga have been reported by L. P. Khlobystin (*AO* 1967, 153 ff.; 1972, 244 f. jointly with G. N. Gracheva). The discovery of thirty-three sites of the periods from the Bronze Age to the Early Iron Age has been reported in the first of these works and in the second several dwellings uncovered at some of the sites were described. It is of interest to note that bronze slag and traces of bronze casting were found in pit-dwellings of the second half of the 1st millennium B.C. situated on the small river Polovinka and two other smaller rivers. The analysis of the bronze artifacts revealed the presence in the alloy of an unusually high percentage of silver and nickel. Furthermore, the study of the material disclosed connections between the inhabitants of the sites with those of the taiga (forest) peoples of both Central and East Siberia and their genetic affinity with the local people of the Neolithic and Bronze Age. The results of investigations in 1973 (*AO* 1973, 229 f.) of the settlements on the river Polovinka and two smaller ones imply that a considerably developed centre of metallurgical production must have been in existence in the basin of the Pyasina during the period mentioned above.

The south of Siberia

Intensive investigations were conducted in the last decade in Khakassia, the country of Minusinsk, in Tuva and in the High Altai, mainly connected with the construction of

large water reservoirs. Their results were briefly reported in many articles, some published in books; also a number of books appeared dealing with larger parts of the south of Siberia and there are monographs devoted to some particular remains of archaeological cultures. Among the latter one book by M. Griaznov, *The Ancient Civilization of South Siberia* (Geneva 1969, translated from Russian by James Hogarth, 251 pages, 170 half-tones and coloured illustrations on tables and a special chronological graph) deals with the prehistoric past of the whole country from the Eneolithic to the Age of the Early Nomads. Special monographs are devoted to the three main cultures which subsequently developed in the major part of the area under review, and beyond it, the Karasuk, Tagarskaya and Tashtyk cultures. The first of these I dealt with in an earlier report (*Bulletin* 7, 1968, 79). In the meantime a new monograph has appeared by N. A. Chlenova, *Khronologiya pamyatnikov Karasukskoy epokhi (The Chronology of the Remains of the Karasuk Age)*, Moscow 1972, 248 pages, 72 tables and two sketch maps with a large bibliography) putting forward the view that the Karasuk culture had developed in the area from the 14th to the 7th-6th centuries B.C. The culture arrived in the area from the south, from Tuva, and entered the Minusinsk basin. In about the 6th century B.C. the Karasuk culture evolved into the Tagarskaya culture which assimilated the Karasuk people. In a special article (*SA* 1972-4, 257-259) the same author describes the gold personal ornaments of the Karasuk culture of the 8th century B.C. and the following centuries. She points out that gold must have been widely known at that time in Siberia and that the level of the Siberian cultures of that period was approximately equal to the cultural level of Central Europe.

The theories by N. A. Chlenova relating to the Karasuk culture presented in the book mentioned above have been contested by E. A. Novgorodova in her paperback *Centralnaya Aziya i Karasukskaya Problema (Central Asia and the Karasuk Problem)*, Moscow 1970, 192 pages, provided with a series of sketch maps showing the geographic diffusion of several bronzes and vessels of the Karasuk type). She distinguished two different, only slightly interconnected, groups of the Karasuk culture which were of different origin and represented two different tribal units contemporary with each other, and which do not represent two stages in the development of the culture. In a review of this work, M. A. Devlet, does not agree with the author's views (*SA* 1972-1, 286 f.). The origin of the Karasuk culture has also been discussed by M. D. Khlobystina (*SA* 1970-1, 121-129).

The subsequent Tagarskaya culture was the theme of an earlier study by N. A. Chlenova, *Proiskhozhdenie i rannyyaya istoriya plemen Tagarskoy kultury (Origin and Early History of the Tagarskaya Culture)*, Moscow 1967, 252 pages, 48 tables). The original bearers of this culture, which was of the 'Scythian' type, were newcomers in the area. The questions concerning the original country of the newcomers, their language (possibly Iranian), chronology and the division of their development into two periods, etc. were discussed by the author. Finally, the Tashtyk culture has been dealt with by L. R. Kyzlasov, *Tashtytskaya Epokha v istorii Khakassko-Minusinskoy Kotloviny (The Tashtyk Age in the History of the Khakass-Minusinsk Basin)*, Moscow 1960, 198 pages). In

this book the end of the Tagarskii period is put as the 3rd century B.C., followed by a transitional Tagarskii-Tashtyk period that lasted until the beginning of the 1st century B.C. The culture had developed up to the 5th century A.D. After dealing with the archaeological remains, the author discussed the relations with China, the recorded wars with the Huns and their conquest in about 200 B.C. of the country which resulted in the downfall of the Tagarskaya culture and, finally, the subsequent relations with the Huns. The book has been reviewed in *SA* 1962-3, 322.

There is a report by M. A. Devlet (*KSIAM* 118, 1969, 33-42) giving a brief review of the main archaeological excavations in South Siberia on the Yenisey and in the Sayan Mountains and another by V. P. Levasheva (*MIA* 130, 1965, 242-244) dealing with the investigation of the ancient irrigation network, traces of which have been found within nearly the entire steppe of Khakassia, in the valley of the river Abakan, and within a larger part of the Minusinsk basin east of the Yenisey.

The area on both sides of the valley of the Yenisey north of Minusinsk and Abakan has been intensively investigated because of the large reservoir being constructed there and the consequent submerging. Investigation east of the river, in the country of Minusinsk, centred around Mount Tepsey, 50 km. north of Minusinsk revealed burials of various periods (Ia. A. Sher with three associates, *AO* 1967, 150 f.; M. P. Zavitukhina, *AO* 1968, 183 f.; M. P. Griaznov *AO* 1968, 176 ff., jointly with M. N. Komarova; *AO* 1969, 177 f.; 170, 202 ff.; and M. P. Pshenitsyna, *AO* 1970, 201 f.; 1973, 218-220). Among the burials were slab-fenced Tagarskaya graves (all ransacked) at point Tepsey XIV, on the river Syda; barrow graves of the Tagarskaya culture of the 4th to 3rd centuries at Rozlev 'on the bottom' of the reservoir under construction; others of the Tagarskaya culture at points VII, XV and XVII; and at point III mainly large vaults with several interments of the Tashtyk period were found.

According to reports archaeological investigations on the Khakassian, western side of the Yenisey, centred on the area around Mount Barsuchikha, in the region of the submerged village of Bateni and up to 12 km. north and near Lake Saragash (M. P. Griaznov, *KSIAM* 107, 1966, 62 ff., jointly with M. N. Pshenitsyna; *AO* 1967, 148 f.; M. N. Pshenitsyna, *AO* 1967, 179 ff.; 1970, 201 f.; 1971, 246 f.; 1972, 233-235; and M. P. Zavitukhina, *AO* 1967, 177 ff.). The largest group excavated was barrow graves of the Tagarskaya culture, especially those of its late stage, and 4th-3rd centuries B.C., but many graves were also of the Karasuk and Tashtyk cultures.

The cemetery Kamenka I (eastern side of the river) has been considered to come at the very beginning of the Tagarskaya culture, whereas the cemetery Kamenka III has been regarded as of the transitional period from the Tagarskaya to Tashtyk culture. However, Carbon 14 determination 160 ± 60 A.D. (LE-724) implies a considerably later date. Other Carbon 14 determinations of graves of the Tagarskaya culture in that region published in *Radiocarbon* 14/2, 1972, 355 f., relate to the barrow grave cemetery of that culture at Kichik-Kyuzur I (barrow grave (Kurgan) I 460 ± 50 B.C. (LE-720) and Kurgan 7, burial 5 230 ± 50 B.C. (LE-271). The date for burial 1 in barrow grave 3 of the Ulug-Kyuzur cemetery in the same region, also of the Tagarskaya culture, is given as 500 B.C.

(LE-696). Burial 1 in barrow grave 4 of the same cemetery was of the Tashtyk culture and its date is given as 280 ± 50 A.D. (LE-723)

In the north of Khakassia in the region of Lake Sukhoye a large barrow grave cemetery was investigated as reported by G. A. Maksimenkov (AO 1967, 145 f.). It consisted of over 120 mounds with over 200 burials. There were Karasuk and Tagarskaya burials but the majority were of the Andronovo culture. The cemetery of Ayeshka near Novoselovo on the Yenisey consisted of about 100 graves of the Tashtyk period, of which 33 'flat' graves and four vaulted graves were investigated (E. V. Vadetskaya, AO 1968, 185 ff.). Carbon 14 determination of one of the vaulted graves is given as 210 ± 50 B.C. (LE-772).

Further south in Khakassia, investigations were concentrated mainly around the Oglakhty Mountains on the Yenisey, some 40 km. down river from Abakan (L. P. Kizlasov, AO 1969, 197 ff.; E. V. Vadetskaya, AO 1972, 201; and N. V. Leontiev, AO 1972, 224 f.). Two Karasuk cemeteries in points Krivaya VI and Luganskoe III and a cemetery 9 km. down river from Mokhova, called Krasnyi Yar, were excavated. In the latter burials of various periods were found — Afanasievo, Okunev, Tagaskii, Tashtyk and some still later. Further south, in the district of Askiz, 6 km. east of Verkhniy Askiz, a cemetery of the Karasuk culture containing about 100 burials has been recorded. 14 slab-cist graves were investigated there and in one of these all the slab cists were covered with incised animal and human figures and with representations of chariots. In the same area barrow graves of the Tagarskaya culture were also found containing slabs or stones on which 'tamga' signs often appear. And on a slab from an early Tagarskaya barrow (of the 7th to 5th century B.C.) near a farm situated in the neighbourhood of the railway bridge on the river Kamyshta, an incised drawing of a 'Scythian wheel' was found (Iu. S. Grishin, KSIAM 128, 1971, 35 f.).

Only a few sites were investigated in the Minusinsk country east of the Yenisey. At Unyuk in the district of Krasnoturanskii north of Minusinsk, an agricultural settlement of the Tashtyk period was investigated and according to A. P. Zyablin (AO 1968, 238 f.) its lower layer was Neolithic. A barrow grave cemetery of the 9th century A.D. was also investigated there. Several sites, dating from the Neolithic to the Middle Ages were also recorded at Tes on the Tuba and in its environs, and three barrow graves of the early (Podgornovskii) stage of the Tagarskaya culture were excavated as were two of a later stage (Saragash) of this culture; they were briefly described by E. V. Vadetskaya (AO 1971, 276 f., with two associates). Finally N. V. Leontiev (AO 1971, 275) reports on the investigation of a cemetery in the outskirts of Minusinsk, consisting of 62 mostly looted Karasuk burials in 'slab-fenced' (*ogradi*) graves. In a site nearby one mound of a barrow grave cemetery was excavated and was found to be of the Tagarskaya culture but the grave had been looted.

The southern mountains

The central Asiatic mountains south of Siberia constitute two 'autonomic' provinces (*oblast*), being the High Altai in the west and the Tuva in the east. However, the West Sayan Mountains that extend along the whole northern border of Tuva belong for the

most part to the Minusinsk country; the Yenisey 'canyon', a very narrow gorge across the West Sayan Mountains, lies entirely within the confines of the latter.

The Upper Altai Mountains are famous for their royal 'frozen tombs' under huge mounds. Their age ranges from about 500 B.C. to about 500 A.D. and three chronological groups have been distinguished. The tombs, especially the most richly endowed earliest burials, have often been described in the archaeological literature and in popular books. Among those lately published, perhaps the most important is the one by S. I. Rudenko, *Kultura naselenia Centralnogo Altaya v Skifskoe vremia* (*The Culture of the Population of Central Altai in the Scythian Age*, Moscow 1960, 360 pages, 120 half-tones, several coloured) to which I have already referred under the section on 'Art and beliefs' which has the advantage of having been translated into English.

The Altai 'Scythians', as they are usually improperly called, are also the theme of many special articles dealing with some aspects of their culture or with some special problems relating to them. One such is an article in a book dealing with artistic rugs and tissues (S. I. Rudenko, *Drevneyshie v mire khudozhestvennye kovry i tkani* (*The Earliest in the World Artistic Rugs and Tissues*, Moscow 1968, 136 pages including 104, mainly half-tone, figures), and another by V. N. Poltoratskaya (*ASE* 5, 1962, 76-90) describes and classifies the various incisions and paintings that appear on a variety of objects found in barrow graves of the 'Early Nomads' (Scythian period) in the High Altai, the earliest appearing in Siberia in the remains of the Bolsherechenskaya culture on the upper Ob outside the Altai Mountains. Of a later date are signs incised on the astragali, which presumably mark their value in gambling. They appear in large numbers in the 2nd to 4th centuries A.D. and in the Tashtyk period in Khakassia and the Minusinsk country, and were there still current up to the 19th century. There is a report of the dendrochronological study of the well-preserved wooden structures of the Pazyryk barrow graves by I. M. Zamontorin (*SA* 1959-1, 21-30) with a description of the method applied from which it appears that mounds 1 and 2 were coeval, mound 4 was constructed six years later and mound 3 37 years after the first two, while mound 5 was constructed 11 years after mound 3, that is 48 years after mounds 1 and 2. Thus all were constructed within a 50 year period. The dates of the Pazyryk barrow graves obtained by radiocarbon analysis, published by S. V. Butomo (*Radiocarbon* 7, 1965, 223) and by A. A. Sementsov and his two associates (*SA* 1969-1, 260) oscillate between 500 and 400 B.C.

Several articles contain mostly brief reports on the results of excavations in various parts of the country. Thus according to S. S. Sorokin (*AO* 1967, 182 f.) 548 mounds were counted in the vicinity of the Pazyryk site on the terrace of the valley of the Bolshoy Ulagan, extending over a distance of c. 2.5 km. Excavation of a number of these revealed that they belonged to three chronological groups, the earliest having been coeval with the Pazyryk burials, the second with burials of about the turn of the Christian Era and the latest with Turcic mounds of the time about 500 A.D. The results of the excavation, started in 1959, of a number of barrow graves at several points on the upper course of the river Bukhtarma on the southern border of the High Altai area (S. S.

Sorokin, *ASE* 8, 1966, 39-60) showed these to be Bolshoy Berelskii barrows, barrows on the Berelskii plateau of the second half of the first millennium B.C., and a few selected barrows in the six groups of the Kurtu barrow grave cemetery of the 9th to 8th centuries B.C. In addition a number of barrow graves of the end of the first millennium B.C. were investigated in the adjoining part of the East Kazakhstan, namely on the tributaries of the Bukhtarma river, including the Katon-Karay barrow grave cemetery at Lesopilka and the Kopay cemetery to its south. On the rocks of the mountains around the Katon-Karay cemetery, petroglyphs were recorded of the same type as those known from the Minusinsk area and in the Pamir Mountains.

There is a brief report on the excavation of 62 mounds of a cemetery consisting of 292 mounds, situated in the valley of the Chuya in the region of Kosh-Agach to the south-east of the Altai Mountains by A. M. Kulemzin (*AO* 1969, 201 f.) and D. G. Savinov (*AO* 1972, 235 f.; 1973, 220 f.) gives brief accounts of the excavation of 17 mounds of the cemeteries of Uzuntay I to VIII. The earliest of these latter mounds were Bronze Age burials of the Mongun-Tagin type of Tuva; next were 'Early Nomad' graves of the 5th to 3rd centuries B.C., and the latest were those of the Turcic period. The second report contains the description of late 'Scythian' barrow graves excavated in the valley Uzuntay in the High Altai in the region of Kosh-Agach. Seven barrows were investigated. Each was adjoining a row of large stones on most of which figures of stags were incised. In six mounds 3 to 6 horse skeletons were found that lay one on another in a special shaft, each with a richly decorated bridle. In the centre, under the mound, in a large shaft two or three chambers were uncovered in each barrow, built of timber logs, in all of which three to five human skeletons lay. All horse skulls and almost all human skulls bore traces of a blow. Weapons, personal ornaments and other grave-goods found in these graves link them to the culture of the Pazyryk group, but on the whole were of a later period within the first half of the 1st millennium A.D.

In recent years intensive archaeological investigations have been undertaken in Tuva in connection with the construction of large water reservoirs along the course of the Upper Yenisey both in the centre of the country and in the valleys of its tributaries and also in the deep and narrow 'canyon', the gorge of the river across the Western Sayan Mountains by which it reaches the Khakass-Minusinsk area. That part of the river flows in the Krasnoyarsk Country, outside the Tuva territory.

A book on the History of Tuva, *Istoria Tuvy* Vol. I, Moscow 1964, chief editor L. P. Potapov, contains a brief outline of the prehistoric past of the country from the Palaeolithic to the 3rd century B.C. (18-34) and from the 3rd century B.C. to the 4th century A.D. (34-54). Both accounts are based on the results of the archaeological research. There is a short article of a general character by N. L. Chlenova (*KSIAM* 107, 1966, 47-53) discussing topics connected with the pre-Scythian remains in Tuva of the time preceding the age of the earliest Pazyryk burials in the High Altai, called the Kazyganskaya culture (Minskaya). She points out that in barrow grave No. 96 at Zubovka on the river Kaa-Khem and in another one on the river Chaa-Khol, a tributary of the Yenisey, bronze knives of the late Karasuk type were found, which at the same time

are similar to those of the Tagarskaya culture of the Scythian period; N. L. Chlenova accordingly considers the two burials mentioned above are Archaic Scythian of a period to which also a series of several other finds in Tuva may be included.

Many reports relate to excavations and research in various parts of Tuva and in the West Sayan Mountains adjoining that country to the north. Thus there are reports by A. D. Grach concerning the region near the junction of the Khemchik with the Yenisey close to the northern border of Tuva (*AO* 1967, 170 ff.; 1968, 186 f.; 1969, 179 ff.) and containing brief summaries of the results of the investigation of barrow grave cemeteries of Aldy-bel (7th to 6th centuries B.C.) and Kuylug-Khem I (5th to 3rd centuries B.C.), but in both secondary burials were found of the Sarmato-Hunnic period. In another report the same author with his four associates mentions more cemeteries investigated in the same region and of the same periods as those above, those of Khemchik-Bom I, II and IV, Argalykty I and XIII (*AO* 1970, 180-182). Connections with and similarities between their contents to their contemporary remains in the neighbouring countries, the High Altai, East Kazakhstan, have been pointed out. Of interest was a barrow grave of the Scythian period in the Argalykty XIII cemetery, which had a 'stag stone'. Two subsequent reports, submitted jointly with G. V. Dluzhnevskaya (*AO* 1971, 237 f.; 1972, 205) briefly relate the results of excavations of a few more barrow grave cemeteries in the same area, of the Sarmato-Hunnic period and of a later date (including Khemchik-Bom V and VI). There is an interesting brief report on the investigation of the cemetery of the 7th to 6th centuries B.C. at Kombuzhap-Aksy on the right bank of the Yenisey at the beginning of the gorge by G. V. Dluzhnevskaya (*AO* 1973, 199 f.).

Five reports by A. M. Mandelshtam relate to the cemetery of Aymyrlyg of the Scythian and Sarmato-Hunnic Ages (*AO* 1968, 189 f.; 1969, 183 f.; 1970, 217; 1972, 228; 1973, 211). Over 300 burials were investigated, many of them looted, mainly of the 5th to 3rd centuries B.C. The site lay on the left side of the Yenisey. The results of the investigation of barrow graves and of other remains in the deep Yenisey gorge around the junctions of the Chinge, Urgun and of other small rivers, outside the confines of Tuva, have been briefly summarised by I. U. Sambu (*AO* 1971, 241 f., jointly with B. G. Shevenko; 1972, 237), by S. N. Astakhov (*AO* 1972, 199) and D. G. Savinov (*AO* 1971, 286 f.). D. G. Savinov in an earlier report published an important Scythian Age secondary burial found in a barrow of the 5th to 3rd century B.C. (*KSIAM* 119, 1969, 104-108). Its crouched skeleton lay in a slab cist, equipped with a bow with bone inlays, an iron knife, a belt with iron buckles and a few clay vessels and some other items. The most important of these was an openwork bronze plaque representing the combat of a tiger with an eagle-griffin (see p. 000 above). The grave was of the period from the 2nd century B.C. to the 1st century A.D., at a time when the burial ritual exhibited by the grave and its grave-goods had already gone out of use in Tuva; it suggests the survival of ancient customs in that part of the country.

A brief account of the results of investigations of remains in the valley of the river Ortaa-Khem, north of the Upper Yenisey (the Ulug-Khem) by N. U. Sambu (*AO* 1967, 173; 1968, 191) gives information about two Scythian Age (5th to 3rd centuries B.C.)

and Sarmato-Hunnic barrow graves of the early centuries A.D. which were excavated there and also of the earliest burials of the Aldy-Belsk period; close analogies to the latter may be found in burials of the early stage of the Tasmolin culture of Kazakhstan.

Investigation in the eastern part of the West Sayan Mountains was conducted by M. Kh. Mannau-Ool (*AO* 1967, 144; 1968, 201 f.; 1969, 202 f.) who later worked with M. P. Griaznov (*AO* 1971, 243-246; 1972, 207 f.; 1973, 192-195). A few barrow graves of the 7th to 3rd centuries B.C. of the Uyuk culture at Buren-Khem in the district of Kaa-Khem were excavated as was one looted barrow of the same culture at Erbek (of the 7th-6th century B.C.). In the valley of the Manchurek in Western Tuva three barrow graves of the 5th-4th centuries B.C. of the same culture were excavated together with two more of a later date. But of particular interest was a barrow grave in the Turan-Uyuk steppe, north-west of Kyzyl, called the 'Arzhan' barrow, considered to be the largest in Tuva, 120 m. in diameter, 3-4 m. high. This was a 'royal' tomb of a special construction of the Scythian period. It had several chambers built of timber logs on the ancient ground surface, in which the king with his wife and 14 attendants and with about 84 horses were buried. The tomb was ransacked. Thirty-three horses were evidently saddle horses buried with their bridoons; all were 12-15 years old.

Investigations were made in the central part of Tuva, south of the Upper Yenisey in the area of the towns of Shagonar and Chaa-Khol by Iu. I. Trifonov (*AO* 1967, 174 ff.; 1968, 192 f.; 1969, 184 f.; 1973, 225 f.). Barrow grave cemeteries Argalykty I and VIII and Kara-Tal IV with burials of a kind of Pazyryk type of the 4th-3rd centuries B.C. were excavated. In two other reports by the same author (*AO* 1971, 239-241; 1972, 241 f.) accounts were given of the excavation of a few barrow graves near the village of Oznachennoe situated at the northern end of the Yenisey gorge, already in the Krasnoyarsk country. Of special interest was a barrow grave of the early stage of the Tagarskaya culture, of the 7th-6th century B.C., placed within the cemetery of the Karasuk period with its characteristic graves in enclosures built of vertical stone slabs. At Letnik VI, in the same region, barrow graves of the Tagarskaya culture were excavated of the 6th-5th centuries B.C. It may also be mentioned that V. N. Poltoratskaya has published reports on the excavations by S. A. Teploukhov from 1926 to 1929 of remains of the time from the 5th century B.C. to the 17th century A.D. in various parts of the country, but chiefly in the central part around Shagonar (*ASE* 8, 1967, 78-102). The major part of these remains were barrow graves of the 5th to 3rd centuries B.C. The equipment was described, dated and connections with and similarities to remains in other countries around discussed. They have been regarded as forming a distinct local cultural group showing its own particular features.

Finally, M. A. Devlet reports on his investigations in East and North-East Tuva, in particular in the area around the Great Yenisey-Biy-Khem in the district of Todzhynskii, the border where the primeval Siberian 'taiga' forests meet with the Central Asiatic steppes (*AO* 1969, 193 f., jointly with A. V. Eltsov; 1970, 188 f., jointly with S. V. Studzitskaya; 1971, 290; 1972, 211 f.; 1973, 202). There, in the region between the Azas and Khochzhyr-Khol Lakes several sites were discovered with traces of occupation from the

Eneolithic up to the Middle Ages. At Azas I, the layer of the 'Scythian period' was well recognizable and seven Sarmato-Hunnic graves were investigated. At Toora-Khem in the same region, two barrow graves of the mid-1st millennium B.C. were excavated.

East Siberia and the Far East

In the country east of the middle Yenisey investigations were undertaken in the valley of the Angara, in particular near the junction of the Ilim with the Yenisey, the area of the construction of a large water reservoir. According to R. S. Vasilevskii traces of two stratified sites were found there, one with the lower layer of the Neolithic and the upper stratum of the Early Iron Age (AO 1968, 204-206; 1969, 189; 1970, 189-191). Pottery, iron slag, traces of smelting iron ore and a number of iron articles were found in the latter. Other sites investigated were a settlement of the Bronze and Iron Ages at Vorobievo on Lake Bolshoe, and in the region of Lake Zhiloy a few encampments of the Neolithic and of the later periods up to the turn of the Christian Era.

Further south in the Buriat and Chita provinces (oblasts) in the Transbaikalian country, investigations were undertaken in several regions. A. V. Davydova worked mainly in the western part of the country (AO 1970, 208; 1973, 195; with S. Minyaev, 1972, 209; 1973, 195 f.). Excavation revealed that the cemetery of Ivolginskii belonged to an earthwork of the 3rd century B.C. to the end of the 1st century B.C. and it contained 216 burials with considerable social differentiation of the population apparent. At Dureny, 35 km. east of the town of Kyakhta a settlement of the ancient Khunni was investigated. It extended over an area about 5 km. long and was of the time around the turn of the Christian Era.

A few reports related to the south of the Chita oblast. I. I. Kirillov and M. V. Konstantinov excavated a slab cist grave at Aginskii, south of Chita, in which near the head of the buried person stood a 'stag stone' with figures of four men incised on it, two of them shooting with bows (AO 1973, 206). In another slab cist grave, at Darasun, among the grave goods was found a tripod clay vessel and a mould for casting socketed axes, and in the valley of the Ali, near Ulan-Sar, a cemetery of the Burkhotuyskaya culture of the 2nd to 10th centuries A.D. was investigated. North-west of Chita but in the Buriat country, near the Isinga Lake, a cemetery of the Early Iron Age was investigated by L. G. Ivashina (AO 1973, 205), and also a settlement of fisher-hunters of the Bronze Age between the lakes Bolshaya and Malaya Charga in the same region. In its neighbourhood a cemetery was discovered and partly investigated and was found to be of the 1st millennium A.D. Investigations in the valley of the river Konda in the centre of the area at Tiukavkino revealed several graves with flagstones ('flagstone graves') and these were described by L. A. Evtiukhova and N. N. Terekhova (MIA 130, 1965, 244-248). Another group of such graves was investigated in the steppe in the region of Borzya in the south-west of the Chita oblast. The great variety of beads found in this cemetery, and in other ones quoted previously, imply the wide commercial connections of the local population. Many sites with traces of ancient settlements have also been discovered in the region on the lower Onon in the oblast of Chita reported by

Iu. S. Grishin (AO 1973, 190f.). At Ust-Liski the site of a settlement was marked by potsherds, stone implements, bronze slag, etc found on the surface of the ground and was found to be of the Bronze and Early Iron Age. Traces of another settlement of the same period were found at Karymskaya Nada near Ust-Ilia; it had two layers of occupation. The upper stratum was of a late age. The lower, which was the main layer, yielded pottery and implements of the Late Bronze Age and Early Iron Age. At a distance from it of 400-500 m. traces were found of a settlement of the Tagarskaya-Scythian period. Further north, in the region of the junction of the Zaza with the Vitim, a tributary of the Lena, a Neolithic settlement was investigated by L. G. Ivashina and E. L. Klimashevskii (AO 1972, 214-216) and burials of the 1st millennium A.D. were found nearby.

A book edited by D. D. Lubsamov dealing with the history of the culture of Buriatia should be mentioned, *Ocherki istorii kultury Buriatii (Essays on the History of the Culture of Buriatia)*, Ulan-Ude 1972, Buriatskii Filial AN Buriat SSR) as should the one by S. A. Fedoseeva, *Drevnie kultury Verkhnego Vilyuya (Ancient Cultures of Upper Vilyuy river)* on which I reported before (*Bulletin* 8-9, 1970, 148): this gives information on the ancient past of the whole of Siberia north-west of Irkutsk. That area forms part of Yakutia covered by a special book by A. P. Okladnikov, *Yakutia Before its Incorporation into the Russian State* (Montreal-London 1970, McGill-Queen's University Press, 499 pages), dealing with the Palaeolithic and later periods and discussing art, beliefs, connections with east and west and the language, economy, present folk culture etc.

The prehistoric past of the country on the river Amur has been the theme of two works by A. P. Derevyanko. In the first, *Novopetrovskaya kultura Srednego Amura (The Novopetrovsk Culture of the Middle Amur)*, Novosibirsk 1970, 204 pages, reviewed by V. V. Sidorov, SA 1972-3, 382-385), a description is given of a large neolithic settlement called Konstantinovka-Novopetrovskaya II and III. The author dates the culture to the 6th to 4th centuries B.C., but this has been questioned by the reviewer, who also criticised several judgments by the author. The other work by this author, *Ranniy zhelezniy vek Priamurya (The Early Iron Age of the Country on the Amur)*, Novosibirsk 1973, 355 pages, 78 tables, 53 figures in the text) contains the description of sites, settlements, the material culture and economy of the population as reflected on the archaeological material of the country of the second and the first half of the 1st millennium B.C. The Urilskaya culture, the chief culture of the country at that period, and its coeval cultures have been described and their connections discussed. An attempt has been made at the reconstruction of the cultural development of the peoples of the country and their tribal migrations.

A. P. Derevyanko also gives an account of the excavation of an Early Iron Age settlement of the Urilskaya culture at Kukelevo in the Jewish Autonomous oblast near Khabarovsk (AO 1968, 225). The author dates the settlement around 1000 B.C.; the Carbon 14 determination is 980 B.C. (LE-652).

Investigations in the Primorskii Kray (the Maritime Country) have been reported by a number of scholars. In the south they were conducted by A. P. Okladnikov and D. L. Brodyanskii (AO 1967, 115-117; 1968, 208-210; 1971, 270 f.). At Maykhe, close to the

Ussuriisk Bay north of Vladivostok, four layers of occupation have been established; the lowest was of the Mesolithic, next of the Neolithic, and over it was the layer of the Sidemi culture with, on top, the stratum of the Chapigoy culture of the Early Iron Age. Remains of several dwellings uncovered were briefly described. There was a similar stratigraphy at the settlement at Krounovka, on the river Chapigou; that at Siniy Gay in the vicinity of Lake Khanka had only two occupation horizons, one of the Neolithic and the other of the late Karasuk or early Tagarskaya period. To the latter belonged four graves with ritually buried boars and stags. In the area of the town Shkotovo, north-east of Vladivostok, a settlement and a number of burial at Malaya Podushechka on the river Kangauz were excavated and proved to be of the Early Iron Age, the 1st millennium B.C. (Zh. Andreeva, *AO* 1969, 204-206; 1971, 283; 1972, 197 f., jointly with A. V. Garkovik). Moreover, the results of the investigation of a settlement of the South Primorie culture at Valentin-Pereeshek on the Valentin Bay, district of Lazo, to which ten graves also belonged were reported.

The results of earlier investigations in the region east of Vladivostok (districts of Olga and Lazo) of sites of the 1st millennium B.C. and the early 1st millennium A.D. were briefly summarised by Zh. Andreeva in a special article (*MIA* 86, 1960, 127-135) while a second article (*MIA* 86, 1960, 136-181) discusses topics concerned with cultures of South-Primorie in the period from the 3rd to the 1st millennium B.C.

A recent report by O. V. Dyakova and V. I. Dyakov deals with the discovery in the northern part of Primorie of a settlement of the Early Iron Age, set up early in that period, and of two earthworks situated about 20 km. north of the town of Noviy Plastun (*AO* 1973, 201). In this context also mention should be made of a work by A. P. Okladnikov, *Pamyatniki Angary (ot Shchukino do Bureti) (Neolithic relics from Shchukino to Bureti)*, Novosibirsk 1974, 320 pages, including 175 line-drawings and plates. It contains reports on the survey and excavation of a considerable number of sites in the area which began in 1938; six later periods have been identified in the cultural development of the country from the 7th-6th millennium to the end of the 2nd millennium B.C.

Finally, there is a book which deals with the prehistory of the island of Sakhalin from the Neolithic (2nd millennium B.C.) to the 16th century A.D. (R. V. Kozyreva, *Drevnii Sakhalin (Ancient Sakhalin)*, Leningrad 1967, 120 pages and a sketch map).

ABBREVIATIONS

- AF: *Issledovaniya po Arkheologii SSSR* (Artamonov Festschrift), Leningrad 1961
 AK: *Arkheologiya*, Kiev (in Ukrainian, mostly with a short summary in Russian)
 AO: *Arkheologicheskiye Otkritiya*, Moscow
 ASE: *Arkheologicheskii Sbornik*, Hermitage, Leningrad
 KSLAM: *Kratkie Soobshcheniya Instituta Arkheologii AN SSSR*, Moscow
 MIA: *Materialy i Issledovaniya po Arkheologii SSSR*, Moscow-Leningrad
 SA: *Sovetskaya Arkheologiya*, Moscow
 SAS: *Sibirskii Arkheologicheskii Sbornik*, Novosibirsk
 SVOD: *Svod Arkheologicheskikh Istochnikov, Arkheologiya SSSR*, Moscow-Leningrad

Economy and Location of Bronze Age 'Arable' Settlements on Dartmoor

by G. T. DENFORD

INTRODUCTION

Charles Thomas, writing in *Archaeological Review for 1969* (No. 4, 13) suggested that:

"The question, 'What happened in the Bronze Age in the South-west?' is one to which the answer must increasingly be sought in settlement patterns and detailed distributional study, rather than in the sphere of artefacts...."

The following is an attempt to examine the distribution of Bronze Age 'arable' settlements on Dartmoor in relation to natural resources and to look at some aspects of their agricultural régime.

The area is considered suitable for such a study having as it does an extensive distribution of settlement remains and, being but little known archaeologically, unproductive to conventional archaeological analysis.

BACKGROUND

Dartmoor is the largest of the granite bosses which form the high moorland areas of the South-west Peninsula, being approximately 300 square miles in areal extent. The upland is everywhere over 700 feet in elevation, rising in the north to 2039 feet — High Willhays — and in the south to 1692 feet — Ryder's Hill. The area forms the major watershed of Devon, with the Tawe and Okement draining northwards to Bideford Bay and the Tavy, Plym, Erme, Avon, Dart and Teign radiating southwards to the English Channel.

The geology of the area is complex, the intruded granite being composed of several distinctive rock types. Variations were caused by the process of mineralization (Gill, 1970, 22) which among other things resulted in large deposits of tin, arsenic, copper and iron.

Weathering of the granite by chemical and physical means has resulted in a landscape dominated by rugged tors; and Pleistocene frost-shattering has produced extensive *clitter* or boulder slopes.

The present Moorland vegetation communities can be divided into wet and dry moor (Gill, 1970, 42). Characteristic of the former are communities of purple moor grass

(*Molinia caerulea*), bog cotton grass (*Eriophorum* spp), cross-leaved heath (*Erica tetralix*), lin (*Calluna vulgaris*) and bell heather (*Erica cinerea*).

The dry moors are divided into grass, heather and whortleberry moors, the former consisting of *Agrostis-Festuca* grassland.

Islands of relict woodland – Wistmans Wood, Black Tor Beare and Piles Copse – in a sea of Moorland, protected from fire and grazing by their clitter slope habitat, provide a silent comment on the extent of man's influence on the natural vegetation.

Above 1400 feet ombrogenous mires, fed by the rain-bearing westerly winds, carry a restricted flora characterized by *Eriophorum* species, with *Sphagnum* in wet areas and cross-leaved heath or heather in dry patches.

A summary of climatic conditions exists in Gill (1970, 43) and various climatic data for the year 1951 can be found in the *Transactions of the Devonshire Association* 84, 284, which give a useful picture of the variability of the climate from one part of the Moor to another.

Perhaps worth noting here is that the eastern part of the Moor today tends to receive less rainfall (average annual rainfall 45-65 ins) than the western part (65-80 ins p.a.).

It is this environment with which Bronze Age Man has been so intimately concerned.

CHRONOLOGY

The dichotomy between 'pastoral' and 'arable' settlement-types and their complementary distribution was first noted by the Dartmoor Exploration Committee (Baring-Gould, 1895, 88) and more recently by Fox (1964, 86; Distribution Maps, Fox 1957, Fig. 5, and Fox, 1954a, 88).

The distribution of the arable settlements (Map I) is seen to correlate with the rolling tableland of the eastern part of Dartmoor between 800 and 1500 feet.

These arable settlements are characterized by one or more huts with associated field systems delimited by rows of granite boulders (Fox, 1954b, Pl. 2b). The field-walls are normally rectilinear enclosing a very small acreage 1.06 acres in the Rippon Tor example (Fox, 1954a, Fig. 2); and 2.01 acres at Blissmoor (Fox, 1954a, Fig. 3).

Dating these fields and farms is difficult. Because of the acid soils little has survived; even pottery is in a very poor state. Furthermore many huts excavated in the late 19th Century and early 20th Century were done so unskilfully and were inadequately recorded.

For the type of analysis that follows it is necessary that the individual 'arable' settlements are shown to be broadly contemporary.

The stratified sites of Gwithian (Megaw, Thomas and Wailes, 1960-61, 200) and Trevisker (ApSimon, 1957-58, 36) have enabled a pottery sequence for Cornwall to be established.

R. C. Reed (1970, 678) subdivides the Cornish MBA into four typological stages and states that in all but the first of these stages the Cornish pottery would appear to have close parallels with that from Dartmoor. He considers that this situation should reflect

upon a south-west metal industry (1970, 679) and that Devon and Cornwall formed a fairly uniform sphere in terms of material culture.

Radford (1952, 59) suggested that size of the hut circle was a chronological criterion and put forward a classification into early and late huts. Type of wall construction was found to correspond with this size criterion. Huts of under 20 ft diameter were generally found with an inner wall of drystone masonry and liner backed by an earth bank which normally faded into the ground. The 'pastoral' pounds were of this type, while huts of over 20 ft diameter normally had narrower walls, stone-faced on either side, with a fill of soil and small stones. The huts with associated field systems were of this type.

Radford, therefore, ascribes the various 'arable' settlements to broadly the same chronological horizon on the basis of size.

He infers that the 'arable' settlements are broadly contemporary with one another.

Reed's typological division of the Cornish MBA pottery would seem to uphold Radford's division. But we should note here that Reed places great reliance on just two fragmentary urns from Smallacombe, a settlement of four huts with field systems on Haytor Down (Map I, 20). This pottery shows characteristics that relate them to Stage 2 and Trevisker 1/1a vessels (Reed, 1970, 686). Thus the Trevisker 1a style of ApSimon (ApSimon, 1957-58, 41 and Fig. 3) characterized by pots with flat-topped, clubbed rims with horizontal ribs on the side of the pot is exactly reproduced in the vessel from Hut 1, Smallacombe (Radford, 1952, Fig. 13, 1).

The Dartmoor 'pastoral' pottery corresponds exactly to pottery types from Cornwall which can be shown to be later MBA — Reed's Stages 3 and 4. The following is a brief résumé of these later parallels.

Stage 3 Reed sees as a 'mixed' corded/incised horizon on the assumption that the transition from the exclusively corded Trevisker II, to the exclusively incised Trevisker III could not have occurred 'overnight'. Evidence of this 'mixed' stage can be found at other sites in Cornwall, for example at Gwithian, layer 5, where vessels decorated with twisted cord ornament are known, and furrowing is also found (Megaw, Thomas, Wailes, 1960-61, 202). This stage is also represented at Ashole Cave, Brixham (South Devon) and at Tredarvah (Reed, 1970, 702).

Pottery from Dartmoor 'pastoral' sites, in particular Yes Tor (Radford, 1952, Fig. 10, 16; Pl. VII 8, 9 and Fig. 10, 12) and Dean Moor (Fox, 1957, Figs. 20, 21) show this combination of decorative elements. Furthermore, the appearance of the broad, flat cordon in this stage — on vessels from Brixham and Tredarvah (Reed, 1970, 703) is also paralleled at Dean Moor (Fox, 1957, Fig. 20, 7). A logical progression to a pure incised stage (Reed's Stage 4) follows stage 3 and again the Dartmoor 'pastoral' pottery offers a close parallel to the Cornish pottery, with a predominance of incised and grooved ware. The tendency to splayed bowls with straight sides which characterizes Trevisker IV (ApSimon, 1957-58, 42) is also seen at Legis Tor (Radford, 1952, Fig. 10, 1, 2, 4) and Raddick Hill (Radford, 1952, Fig. 10, 9). The finger-nail and finger-tip techniques of Trevisker IV (ApSimon, 1957-58, 42) are also seen on Legis Tor (Radford, 1952, Fig. 10, 4) and Raddick Hill (Radford 1952, Fig. 10, 11) pottery.

MAP 1



Scale

(after Fox 1954)



7 miles



huts and fields

Contours



1500 ft



800 ft

ECONOMY AND LOCATION OF BRONZE AGE 'ARABLE' SETTLEMENTS ON DARTMOOR

LIST OF SITES SHOWN ON MAP I (see Fox, 1954a, 100-102, for further details)

	<i>Grid Ref.</i>
1. Shilstone	6590
2. Buttern	6588
3. Shovel Down	6585
4. Kestor	6686
5. Boldventure	6785
6. Thornworthy Gate	6684
7. Metherall	6784
8. Assycombe	659827
9. Whiten Ridge	644818
10. Stannon Brook	648817
11. Hartland Tor	644802
12. Christow Common	8285
13. Bush Down	6882
14. Cullacombe (Shapley Common)	6982
15. Coombe Down	7081
16. Easdon Tor	732822
17. Blissmoor	739807
18. Hayne Down	742797
19. Honeybag Tor	732785
20. Smallacombe Rocks	756783
21. Holwell	746772
22. Rippon Tor	754758
23. Foales Arrishes	738758
24. Halshanger Common	751748
25. Horridge Common	7574
26. Corndon Down	677759
27. Dartmeet	6773
28. Sherrill, Corndon Down	6874
29. Yartor Down	6873
30. Sharp Tor	6873
31. Rowbrook	6772
32. Holne Moor	6870
33. Saddle Bridge, O Brook	6671
34. Combestone Tor	672713
35. Hangman's Pit	6771
36. Shaugh Moor	5563
37. Wigford Down, N.	5465; 5365
38. Wigford Down, W.	5464
39. Wigford Down, S.	5464

Reed notes that the placing of the Dartmoor pottery into his typological sequence of the Cornish MBA pottery vindicates Radford's use of hut-size as a chronological criterion (although in fact reversing Radford's chronology, placing, as we have seen, the large huts with field systems in typological Stage 2 and the smaller huts of the 'pastoral' sites in typological Stages 3 and 4).

Like Radford, Reed is assuming that the individual arable settlements are all broadly contemporary when he places the 'arable' settlements as a group in a position chronologically earlier than the 'pastoral' settlements (Reed, 1970, 695). For as already stated we are dealing with only two sherds from one site — that of Smallacombe. However, the fact that the rather more abundant pottery from the 'pastoral' sites is consistently referable to the later stages (3 and 4) of Reed's sequence — and thus isolating the 'pastoral' settlements as a group — may be taken to show that the various 'arable' sites

likewise form a chronological group which is coincident with Radford's use of hut size as a criterion.

For present purposes then, the distribution of the huts with field systems shown in Map I is taken to be broadly contemporary.

Regarding the absolute chronology, the Gwithian site provides an anchor. Layer 3 has yielded two bronze pins with South German affinities dated to the period 1300-1100 BC. and an axe mould which is tentatively dated to the period c. 1000-900 BC. (Megaw, Thomas, Wailes, 1960-61, 203). A recent find of a possible 'Bohemian Palstave' in an ancient field system on Horridge Common is also significant. On the assumption that it is contemporary with the occupation of the settlement it would indicate that these 'arable' settlements are contemporary with the Tumulus Culture or earlier Urnfields, very approximately from the 14th to the 12th or 11th centuries BC. (Fox and Britton, 1969, 225).

FACTORS INFLUENCING THE SETTLEMENT PATTERN

General Principle

Garner (1967, 304) formulates a number of premises on which models of settlement location are founded. He notes that:

- (i) The spatial distribution of human activity reflects an ordered adjustment to the factor of distance and
- (ii) Locational decisions are taken, in general, so as to minimize the frictional effects of distance.

This concept of distance and of movement — minimization is fundamental to this work.

Hudson has noted the effects of competition on the settlement pattern. With increasing population density, competition for space becomes increasingly important (Hudson, 1969, 365). This is because the physical space available — the 'biotope' of Hudson — is finite in size and so there is competition between farmers to expand their holdings and to make maximum use of available land. Under low density conditions there is no need for competition; new areas of land can be exploited and new settlements created without affecting the position or size of those already present.

Competition would thus provide great regularity in settlement pattern rather in the same way that the isolation of biological populations (Odum, 1959, 221) is usually the result of (i) interindividual competition or (ii) actual directed antagonism. In our case, 'actual directed antagonism' need only mean active observance of boundaries between territories.

Settlement and their territories would be 'packed' into an area as efficiently as possible — to make the most efficient use of resources given a high density population and competition between farmers to exploit those resources.

Haggett observes how the maximum 'packing' of settlements and their territories into an area would involve geometrical considerations consistent with movement-minimization (Haggett, 1965, 48-49). His theoretical triangular lattice of settlements (1965, 88)

however, is conditional upon the area settled being physically homogeneous with a uniform distribution of resources such that any part of the 'biotype' would be as capable of supporting a given population density as any other. In practice, these conditions are rarely found. In our study area, localization of resources, topographical and other physical factors will have resulted in a distortion of the regular lattice (Haggett, 1965, 94-95). But nevertheless, if we accept Fox's assumption that "..... in certain areas like Dartmoor the habitable land must have been fully taken up" (Fox, 1964, 84) — based on the high concentration of settlement remains (and supported by Simmons, 1969, 205, who records increased forest clearance in this period) — we could expect the maximum packing of settlements and their territories into the 'biotope'. We could also expect the maximum spacing of settlements within the limits permitted by localization of resources.

This is of importance as regards Thiessen Analysis (see below).

Site Catchment Areas

The 'territory' surrounding a settlement is taken here to correspond with the 'site catchment area' of Jarman, Vita-Finzi and Higgs (1972, 62) i.e. the area exploitable from a particular site.

The site catchment area would provide the settlement with its basic needs. Chisholm (1968, 102) lists these needs and comments on their locational importance. The ultimate location of a site will, therefore, be the product of external relationships with other settlements (i.e. competition) and internal relationships between the distribution of essential resources.

The significance of essential resources as locational factors has been observed by Orwin (1954, 24) who writes:

"A study of the map in any region of hill and valley shows how parish boundaries were defined by farming considerations. Taking extreme examples so as to demonstrate the point more clearly, it may be shown how the need for shelter, for water, for grazing-land and land for tillage, in the proportions necessary to sustain the community, determined the size and shape of the allocation of land which came, ultimately, to form the parish."

He then goes on to give examples; in Berkshire, for instance, the elongated shape of the parishes running from the Vale of White Horse to the top of the chalk areas include a range of environments, each supplying a particular element. Thus each parish has its strip of grassland running into the wet land of the Vale, its strip of light ploughland in the middle and its long strip of downland for grazing.

Further examples can be seen in the parish boundaries of the villages surrounding Dartmoor, perhaps most clearly in the parishes of Shaugh Prior, Cornwood, Harford, Ugborough, South Brent, Dean Prior, West Buckfastleigh and Holne (see Administrative Map, England and Wales, Devonshire (South part, 1966). All include rich lowland pastures with an expanse of Moorland — common grazing land.

Though the examples given are at the village scale, the same considerations apply at the scale of the individual settlement. Orwin (1954, 26) notes how in Saxon times the

farmer's holding reflected the layout of the parish — each of them had his share of grazing land, of good tillable land, and of the wet, low-lying grassland.

My contention is that the same considerations are applicable to the 'arable' settlement on Dartmoor.

There is little evidence to show dependence on resources that could not have been obtained in the immediate area of the site, i.e. in the site catchment area.

Excavations at the end of the last century and in the first half of the present, produced some obvious 'imports'. At Metherel (7, Map I), Hansford Worth records 14 pieces of flint from one hut and a further 5 chips from another (Hansford Worth, 1937, Pls. XXII, XXVII). 'Fragments of flint' are recorded from the sites of Whiten Ridge (Baring-Gould, 1896, 183), Smallacombe Rocks (Baring-Gould, 1897, 157) — where a 'well-worked flint knife' was found (1897, Pl. II, fig. 3) — Halshanger Common (Baring-Gould 1897, 156), and Foales Arrishes (Baring-Gould, 1897, 151) — where, in addition to various flint flakes, a 'double-notched scraper' was found (1897, Pl. II, Fig. 2). These sites are numbers 9, 20, 24 and 23 respectively on Map I. At the Cullacombe site (14, Map I) reference is made to "two pieces of chalk flint and two nodules of Greensand flint" (Baring-Gould, 1895, 90). The statement points to the origin of the flint. The nearest Cretaceous deposits of Upper Greensand and chalk occur in East Devon (Edmonds, McKeown, Williams, 1969, Fig. 18) with a westerly outlier of the non-Calcareous, Blackdown facies of the Upper Greensand in the Haldon Hills, only 4 miles from Dartmoor. The Upper Greensand of the Haldon Hills is capped by flint gravels (1969, 70). The upper chalk outcrops on the coast at Beer (1969, Fig. 18 and p. 70). The chalk contains numerous courses of nodular flints.

The 22 pieces of flint from the Kestor site (4, Map I) are regarded as having been obtained from the Haldon ridge, or from the chalk at Beer (Fox, 1954b, 58). Other finds from the Kestor site show that resources outside the site catchment area were utilized. A whetstone (Fox, 1954b, 56 and Pl. XA) has been indentified as a fine-grained sandstone probably from the Culm Measures, and a hammerstone of similar material was found. The Culm Measures — the Carboniferous rocks of S.W. England — largely surround the granite mass (Edmonds, McKeown, Williams, 1969, Fig. 1). The nearest deposits to the Kestor site are at a distance of 5-6 miles.

Also from Kestor, a hammerstone of fine-grained dark, red sandstone is thought to come from the Budleigh Salterton pebble beds in East Devon (Edmonds, McKeown, Williams, 1969, 58).

An analysis of the clay used to manufacture the pottery might be interesting. The paste of the Smallacombe Rocks sherd is reported as being 'mixed with quartz and powdered granite' (Baring-Gould, 1897, 157). Analysis would probably support this view that local clays were used.

Certain materials then, which could not be obtained in the immediate areas of the site, but which had desirable properties (e.g. flints, sandstones) were 'imported'. When suited to the task in hand the local granites were used, for example the quern stone of fine-grained granite from Kestor (Fox, 1954b, Pl. XI A).

These 'imported' elements, however, will have had no influence on the siting of the settlement (after Chisholm, 1968, 103). They would be required infrequently and then only in small amounts.

We can regard each settlement and its surrounding territory, therefore, as a self-contained economic unit.

Size of the Site Catchment Area

Chisholm's work on movement minimization, observed in present-day agricultural communities — of which more will be said later — has shown that the territory exploited from a site tends to lie within certain well-defined limits. Very briefly, the further the land is from the site the less likely it is to be exploited from it. For as already mentioned, distance may be regarded in terms of time taken. Thus Barker (1972, 183-184) notes that in Central Italy today, shepherds and herdsmen in a variety of very different areas usually adopt a time factor of one hour alone on foot and two hours with stock from where the animals were stalled at night. The adoption of this time factor generally results in the exploitation of pastures within 3 or 4 km. of the village, farm or fold. Pastures at a greater remove are seldom exploited because it is not economically viable. Indeed, Barker notes that when the pasture in the area is in danger of being overgrazed it is more economical to shift the livestock to a new home base and a new territory, rather than expend the energy of the animals driving them for more than 4 hours a days to pastures further afield.

Chisholm, too, found that at about 3 or 4 kms "the costs of operation rise sufficiently to be oppressive and seriously detrimental..... it is exceptional for distances greatly to exceed this limit with any frequency." (Chisholm, 1968, 66).

It might be assumed then that the catchment area of a site would include all land within a radius of 3 or 4 kms. But in a densely occupied region, such as our study area seems to have been, judging by the frequency of settlement remains, then the size of the catchment area would be limited because of the competition factor.

Thiessen Analysis

Acknowledging the influence exerted by the basic elements of the economy in the siting of the settlement, i.e. the settlements will be 'pulled' out of their regular lattice positions in order that each should have a territory which would provide the basic elements (Chisholm, 1968, 102), it might be possible to delimit the territory — the site catchment area — using Thiessen Analysis.

This is in accordance with Haggett (1965, 94).

Fig. 1 shows seven settlements, distributed over an area of uniform resources, forming a regular lattice, each surrounded by its hexagonal territory.

Fig. 2 shows the distortion of the regular lattice due to resource localization. The settlements are arranged so that each commands a share in the resource. Haggett notes that the appropriate changes in their territories can be determined by Thiessen Analysis.

In our study area the extant settlement pattern presents us with the position shown in Fig.2.

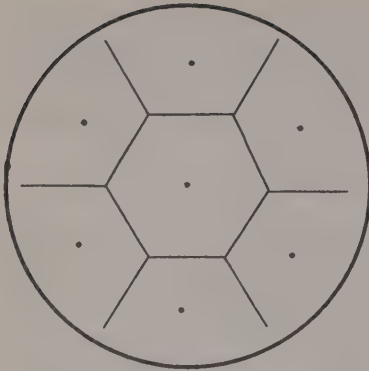


Fig. 1

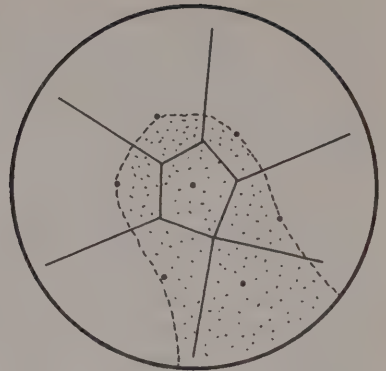


Fig. 2

In order to use Thiessen Analysis in this way the assumption has to be made that all 'the habitable land must have been fully taken up' and that competition between settlements, in making for the most efficient use of resources, will have resulted in the maximum spacing of settlements (within the bounds permitted by the localization of resources).

In short, Thiessen Analysis can be used to delimit the site catchment areas in regions where we could expect the maximum packing of settlements and their catchment areas into the 'biotope'.

One site will now be considered and its catchment area constructed in relation to surrounding sites.

The site chosen for analysis is Blissmoor (17, Map I). This site (Grid Ref. SX 739807) consists of three huts, 21-23 feet in diameter, associated with 6-7 fields, totalling 2.17 acres, at an elevation of 1050-1150 on the north-west slopes of Hayne Down, Manaton. For a plan of the site see Fox (1954a, 92, Fig. 3).

Map II shows the construction by Thiessen Analysis of the site catchment areas of Blissmoor and adjacent sites.

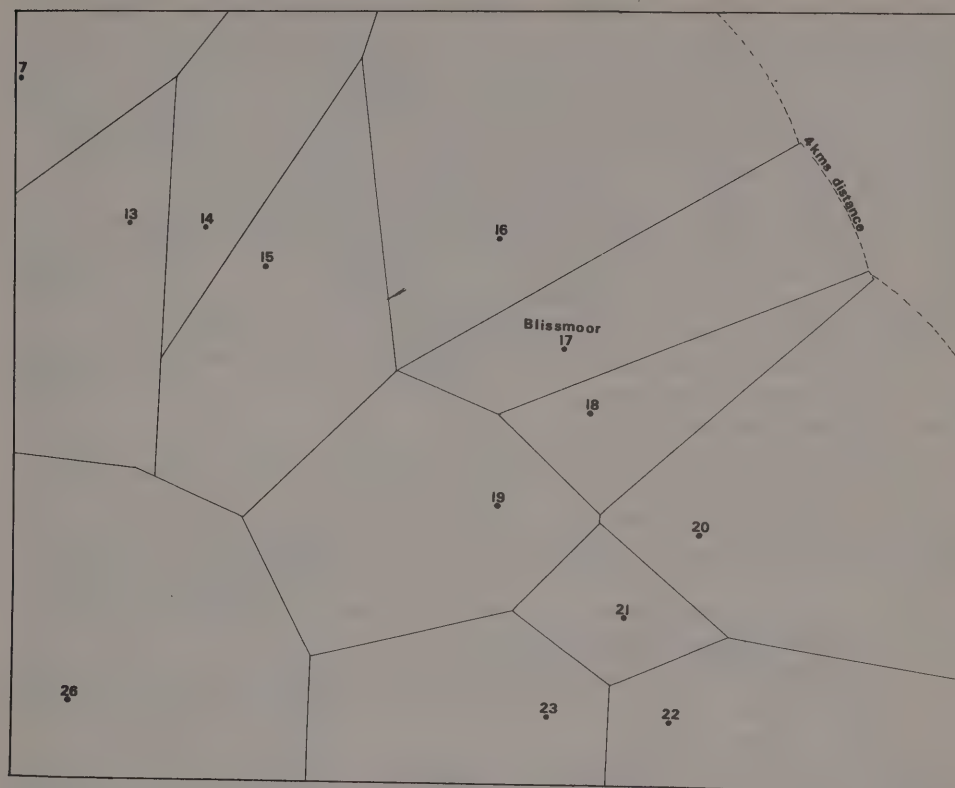
Economy and Agricultural Régime

Up to now the sites have been referred to as 'arable' settlements without further elaboration.

The uniform nature of the settlements, the regular size of the individual fields (from $\frac{1}{4}$ - $\frac{1}{2}$ acre) and their regular shape, reflect strong traditions and a highly developed agricultural system. Furthermore, the deliberate planning involved in the layout of the fields must indicate long-term usage.

Now if we accept Bowen's explanation of the formation of lynchets (Bowen, 1962, 15), i.e. that they are formed by the movement of soil caused by the action of cultivation, then we must see the lynchets reported from a number of the Dartmoor sites as indicators of cultivation. For examples see Fox (1954a, Figs. 2, 3; 1954b, Figs. 2, 4).

ECONOMY AND LOCATION OF BRONZE AGE 'ARABLE' SETTLEMENTS ON DARTMOOR



MAP II
Thiessen Analysis of Blissmoor and adjacent sites
Scale



In this region of minerally poor soil, we could expect progressive cropping to run down the ultimate fertility of the soil. This deterioration could be corrected to a point by making additions to the soil, for instance, by manuring.

Curwen (1927, 286) observes that:

"When one sees, as one does at Kestor and Foales Arrishes, rectangular fields, sometimes with considerable lynchets, and no visible evidence of any two-field or three-field rotation of crops, one is justified in assuming that some sort of manurial treatment must have been adopted....."

Kosse's work on phosphorus levels (Kosse, unpublished mss) suggests that manuring did indeed take place — see below.

From Gwithian, there is further evidence that prehistoric man had recognized that additives maintain yields. Megaw, Thomas and Wailes noted that the layer 5 plough soil

differed to the east and west of the stone bank running through the site (1960-61, Fig. 21). East of the bank, layer 5 is more earthy, containing an even scatter of domestic debris — including charcoal, animal bones, shell fragments and worn pieces of pottery — and bits of stone. To the west of the wall the soil is rather sandier. They suggest that the eastern layer 5 was manured with animal dung, household refuse etc. which was accumulated in a midden and then spread out on the fields. The fragments of pottery found on modern plough soils have been deposited in a like manner.

The discovery of traces of cross-ploughing at the base of layer 5 (1960-61, 204, Pl. IV) enabled them to conclude that layer 5 “represents a farm of approximately EBA2/MBA1 date, with a series of fields apparently under fairly continuous cultivation by cross-ploughing, and probably in part systematically manured.” (1960-61, 214).

They suggest that the area and disposition of the layer 5 fields compares quite closely with the settlements in our study area — i.e. small, squarish fields, presence of lynchets (and, as we now know, manuring).

Small, square fields and cross-ploughing are associated with the use of the ard (Curwen, 1946, 63; Cambridge Economic History, 1966, 96).

Fowler (1971, 162) summarises the earliest evidence for the appearance of the ard, citing the criss-cross ard-marks beneath the South Street barrow at Avebury as the earliest examples from Britain. Here, a date of 2810 ± 130 BC. (BM 356) was obtained from charcoal on the surface of the buried soil beneath the mound. Ard-marks occurred in the surface of the subsoil beneath this buried soil.

On the Continent, present evidence suggests that the ard was in use at least by the first part of the 2nd Millennium BC. Fowler mentions typical examples of ard-marks beneath EBA barrows in Denmark.

The growing amount of information would suggest then that the use of the ard and by implication a regular system of fields is of considerable antiquity in Britain. Furthermore, finds of ard-marks on clay at Aptrup in Denmark and on Boulder clay at Walker, Northumberland (Fowler, 1971, 165), weaken the traditional generalization that the ard was only of any use on light soils. It is not unreasonable, therefore, to infer the use of the ard on the heavy moorland soils of our study area. The boulder-strewn nature of the Dartmoor slopes would have presented problems to the use of the ard, but doubtless stones and boulders were removed prior to cultivation and incorporated into field boundaries, house walls, etc. The fields of the Blissmoor site certainly seem to be freer of stones and boulders than the adjacent clutter slopes. It is also interesting to speculate whether frost-lift, which brings small stones and often larger ones to the surface in some areas, was ever a problem of Dartmoor. If it was then clearing the fields of stones would have been a running battle.

When it comes to a consideration of the type of crop cultivated in our arable settlements we can only make assumptions.

Helbaek (1952, 204) has observed that with the appearance of Beaker Ware there is a marked change in agricultural habits. Contrary to the preceding Neolithic, barley becomes the principal crop. Working with cereal impressions he established that of 127 impressions

on Windmill Hill pottery, over 90 per cent were of Wheat and less than 10 per cent were of barley (1952, Fig. 1). Though the EBA impressions are few in number — only 27 were found from South England (1952, Fig. 7) — the high barley rate (83 per cent of the cereals) is consistent with the frequency established elsewhere.

The predominance of barley prevails throughout the Bronze Age. In Denmark and Holland the same trend is reported.

There is no direct evidence from the Dartmoor sites that barley was the chief crop and so once again we have to turn to the Cornish evidence. Helbaek (1952, 226) has found grain impressions on the following MBA urns:—

Treworrick	(Naked and hulled barley)
Pedugwinian Point	(Naked barley)
Tresawsen	(T. dicoccum and naked and hulled barley)
Ballowel Cairn	(hulled barley)
Chykarne	(naked barley)
Boscawen-un	(T. dicoccum)

The predominance of barley over wheat conforms with the general trend in the Bronze Age.

In view of the close connections between Cornwall and our area (Reed, 1970, 679) it is reasonable to assume that the chief crop cultivated in the fields of our arable settlements was barley.

It is interesting that barley, being rather intolerant of cold conditions, is rarely found cultivated above 1500 feet. As Fox has observed (1954a, 89) the upper limit of settlement in the Bronze Age seems to have been 1500 feet (Whiten Ridge, 9, Map I). The two facts are perhaps related.

The present day seed/yield ratio of barley from areas on the fringe of the Moor is generally 1:25 (Ministry of Agriculture, Communication). But under prehistoric conditions of agriculture this ratio would have been considerably lower. Compared with modern crops, the grain was of inferior size (Helbaek, 1952, Fig. 9). The plants would have been less developed and consequently the yield lower than that of modern times.

Primitive techniques of cultivation using crude implements whether plough or hoe and digging-stick (as Curwen suggests, 1927, 283-285) would also have kept yields down.

The yields would have been closer to those recorded for the Mediaeval period.

Van Bath states that low seed/yield ratios of 1:3 or 1:4 (Van Bath, 1963, 18 and Table II) were the rule in the Mediaeval period. This would mean that a large part of the arable — $\frac{1}{3}$ or $\frac{1}{4}$ — had to be kept for growing the next year's seed. The lower the seed/yield ratio, the smaller the area which can be cultivated with cereals for human food.

If we consider that primitive means of cultivation, of breaking the ground, manuring etc. and poor seedcorn would have led not only to low yields, but also to variable yields, we can see that farming would have been extremely vulnerable if the total area of the arable was only 2 acres (i.e. the area of the enclosed fields). For instance, if we assume a seed/yield ratio of 1:3 this would mean that a third of the total acreage would have to be reserved for the next year's seed. This would leave only 1.34 acres to provide food. Much

depends, of course, on the size of the population to be supported, but even so, Fleming (1971, 10) estimates that about 2 acres per head would have been necessary to support a given population.

It is improbable, on the basis of these figures, that the small area of enclosed fields could support the settlement.

Von Thunen

Kosse has undertaken work on phosphorus levels in 'Celtic' fields. Differences in the phosphorus content of the soil are considered to reflect past manuring practices. His work on the Blissmoor site suggests an intensification of manuring in the fields immediately surrounding the farmstead and thus an intensification of agricultural production in these fields (Kosse, unpub. mss).

The manure would have accumulated in byres or in the yard adjacent to the dwelling-place. Now by the 'law' of diminishing returns (Chisholm, 1968, 26) each successive increase of inputs yields a smaller increment of production than the last. Thus the nearer the land is to the farmstead — the sources of all inputs to the land (manure, labour and so forth) — the more worthwhile it is to intensify production, because savings in transport costs compensate for higher production costs.

The surviving field systems on Dartmoor reflect the small area of heavily manured land surrounding the farmstead that was under permanent cultivation. Such a location of the intensively cultivated land is consistent with the theories developed and expounded by Von Thünen. Summaries of his theories of the location of agricultural production are available in Chisholm (1968, 20-32) and Grotewold (1959, 348).

Although these theories were developed at the city-scale, Von Thünen did observe that the same arguments were applicable at the level of the individual farm.

Of significance to us is the conclusion that there are two ways in which the adjustment to distance may take place:

- (i) the same products may be grown less intensively
- (ii) there may be a substitution of products which are less demanding of labour.

Chisholm notes that Dutch studies on the mineral status of the soil around the farmstead have shown a universal tendency for the mineral status to decline with increasing distance from the farmstead. The conclusion drawn is that there is less frequent application of fertilizers with distance (Chisholm, 1968, 54).

The same conclusion may be reached with regard to Kosse's work on the Blissmoor site, i.e. the higher phosphorus levels in the fields near the huts and lower values in the fields further removed imply more intensive manuring of the fields nearest to the farmstead.

We might expect, therefore, a 'ring' of land, farmed using more extensive methods of cultivation, i.e. in which inputs of manure and labour were less intensive, peripheral to the small, enclosed fields. We have already observed the improbability of such small areas of arable land as the enclosed fields represent being able to support the farmstead throughout the year. I suggest that the yields obtained from the land under permanent cultivation were augmented by crops taken from this zone of extensive cultivation.

Infield-Outfield

Such a system of land management would correspond to the Infield-Outfield system of the Celtic regions of Western Europe, in which the greater part of the land is cultivated only temporarily, while a small portion of it is under permanent cultivation. J. E. Handley, in his book, *Scottish Farming in the 18th Century* (1953, 38-44) describes the characteristics of the system. He notes that the 'infield' was kept under constant tillage, and that the 'outfield' was ploughed and rested alternatively. The 'infield' (or 'Croftland') was the area immediately surrounding the farmstead, which received all the available dung, applied in spring in preparation for barley. Two crops of oats then followed on the 'infield'.

On the 'outfield', Handley states that a crop of oats was taken for as long as it was worthwhile. When yields became low the land was allowed to revert to grass so that the soil could recover. In the meantime another part of the 'outfield' was under cultivation.

In general, the 'infield' occupied one-third of all cultivated land, the 'outfield' the remainder, but this proportion varied. Forsyth (*in* Handley, 1953, 41, Footnote 4) stated that the quantity of 'infield' land depended on the number of cattle wintered and housed on the farm:

"An acre of land for each five or six cattle was cattle infield."

If we take the average acreage of the enclosed fields on Dartmoor to be about 2 acres (i.e. an 'infield' of about 2 acres) then using Forsyth's estimate, the number of cattle on any one farm would have been from 10-12.

Van Bath (1963, 256) states that it was reckoned in 18th Century Flanders that 100 cartloads of farmyard manure were needed for 1.33 hectares — which is about 3 acres. He further states an example of a farmer who kept 19 cows and 5 horses in a byre, which, with the addition of night soil and pig's dung, provided the amount of manure needed.

General comparison of these figures might suggest that the estimate of 10-12 cattle per farm would have been sufficient to provide the necessary manure. Much, of course, depends on the quality of the manure — whether or not it was mixed with a high proportion of straw or sand, etc.

It would be interesting to know whether the land was being sufficiently manured. Certainly shortage of manure seems to have been common throughout history. In the later Roman Empire (Cambridge Economic History, 1966, 95) farmers were urged to use pigeon and poultry dung; and lees from the wine-vat were added to the compost heap. And in 18th Century Flanders, the great demand for manure led to an extensive manure trade (Van Bath, 1963, 256).

Any such shortage in our study area would soon have affected yields because the soils tend to be deficient in base status (Clayden and Manley, 1964, 123).

The small area of the 'infield' reflects an adjustment to the amount of manure available (In 18th Century Scotland, those farmers able to secure a supply of manure from the growing towns were able to increase the size of their 'infield' at the expense of the 'outfield').

Presumably the cattle were overwintered in byres and the manure spread on the

fields in spring, in the manner which has been observed in 18th Century Scotland. In the summer they were possibly folded on parts of the 'outfield' in temporary pens in order to prepare the soil for cropping. Andersen, (*in* Handley, 1953, 42) in the County of Aberdeen, writes of: "a wall of sod..... which forms a temporary inclosure that is employed as a penn for confining the cattle during the night time, and for two or three hours each day at noon. It thus gets a tolerably full dunging, after which it is ploughed up for oats during the winter. In the same manner it is ploughed successively for oats for four or five years, or as long as it will carry any crop worth reaping. It is then abandoned for five or six years during which time it gets by degrees a sward of poor grass, when it is again subjected to the same rotation."

Perhaps then, as already suggested, the bulk of the food supplying the Bronze Age farms on Dartmoor was obtained from the 'infield', which was supplemented by crops taken from the 'outfield'. Possibly the 'outfield' was manured after the manner recorded by Anderson. Any such pens, being only temporary structures, would have left no trace. Possibly they were constructed of turf.

Finally, with reference to the Scottish Infield-Outfield system, all farms had a moor or waste beyond the 'outfield' which was common to all tenants and provided pasture (Handley, 1953, 45). More will be said of this in relation to our area below.

One point to note is that the range of crops cultivated in the Bronze Age did not include oats or pulses, which were an integral part of the Scottish Infield-Outfield system (Van Bath, 1963, 246). Perhaps the rotation of crops involved barley and wheat; and Helbaek (1952, 204-6) also lists flax as being grown in the Bronze Age.

Movement-Minimization: Present-day Agricultural Communities

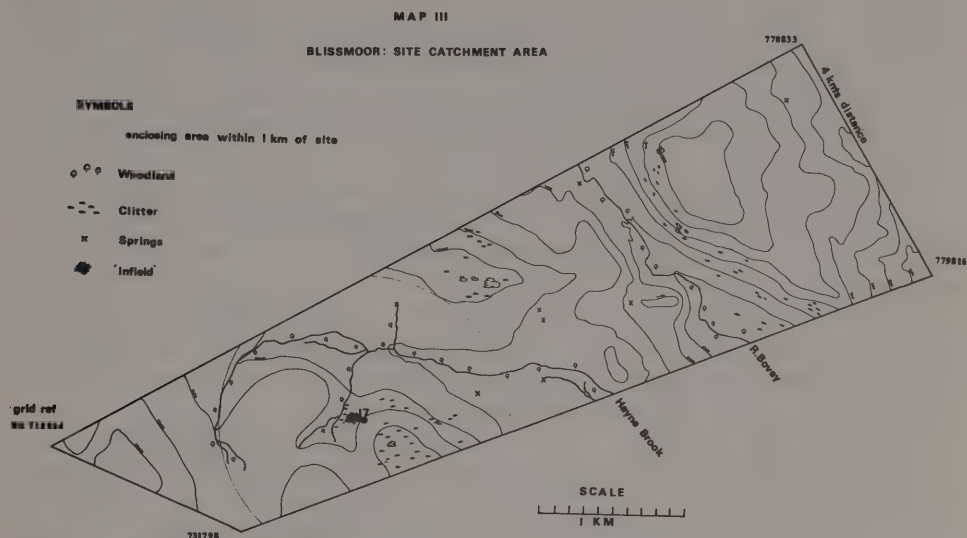
Von Thunen noted the zoning of crops around the individual farm or village and Chisholm has considered the relation of production to distance and the magnitude of distance involved with reference to present day agricultural communities (Chisholm, 1968, 49). The material quoted by him, from Finland, Sweden, the Netherlands and Pakistan, applies to a technical level where human location and the use of draught animals for ploughing and transport prevailed. Such figures would thus be relevant to the conditions prevailing in the Bronze Age in our study area — where presumably oxen were used to draw the ard (rock-carvings from the Val Camonica depict the ard being drawn by a pair of oxen (Anati, 1964, 50, 115, 117) — the carvings are dated by Anati to the Bronze Age — (1964, 43).

Data from Finland shows that at an average distance of just 1 km. from the farmstead the net return (gross product minus cost of inputs) had fallen by 44 per cent. In the Netherlands, the net product was found to fall by 15-20 per cent for each km., and figures from the Punjab in Pakistan show a reduction in net product of 20 per cent for every km. distance from the farmstead.

The evidence would suggest then, that at a distance of 1 km. "the decline in net return is large enough to be significant as a factor adversely affecting the prosperity of the farming population." (Chisholm, 1968, 66).

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This must be borne in mind when we come to consider the location of agriculture in our study area.



Blissmoor: Site Catchment Area

Map III shows the site catchment area of Blissmoor arrived at by Thiessen Analysis. Where competition has not been a factor in determining the extent of the catchment area all land within 4 kms of the site has been included (see above).

Environmental Consideration

Ellison and Harriss (1972, 918) when assessing the potential resources within the site catchment areas of Middle and Late Bronze Age sites in Wiltshire and Sussex referred to the O.S. *Map of Land Classification* of 1944. It is not possible to do a comparable study in our area because of environmental change. It is doubtful whether conditions shown on the 1944 Land Classification map would have much relation to those prevailing on MBA Dartmoor. One moral Simmons draws from his pollen work on Dartmoor is that:

"It is dangerous to use the present landscape as an uncritical standpoint from which to project early relationships; so much has changed — not only vegetation type and species composition, but soil type and some features of drainage such as runoff intensity." (Simmons, 1969, 216).

His series of pollen diagrams cover the Post-Glacial period from early zone IV to the present day (Simmons, 1964, 165). They show the development of forest in pollen zones IV – VIIa and the rise of *Quercus* as the dominant tree of the forest during zones V and VI. Furthermore, an overall view of the diagram shows the influence of man on the vegetation through gradual deforestation, which has resulted in the characteristic Moorland vegetation of today.

We have referred to the pastoral activities of the Bronze Age farmers when manuring was considered; and the presence of spindle whorls on the Kestor site (Fox, 1954b, Pl. 12b) show that sheep were kept. The combination of cattle and sheep would make economic sense. Shirlaw (1966, 34) remarks that cattle and sheep are to some extent complementary on present day British hill farms; the cattle can graze rough pasture that is not suited to sheep and the sheep make use of the land that cattle cannot graze. For this reason then, farms with both cattle and sheep enterprises are more profitable than those with sheep or cattle alone. In the absence of any faunal remains from the Dartmoor sites, we can assume that both cattle and sheep were grazed.

The moorland vegetation today provides rough grazing for cattle, sheep and ponies. The problem is to ascertain what grazing was available in our study area during the Bronze Age.

The pollen diagrams show the continuous presence of indicators of clearances in this period (which lies in pollen zone VIIb). The diagrams show that *Quercus* declines gradually and herbaceous types, e.g. *Artemisia* and *Rumex*, increase (Simmons, 1964, 170 and Figs. 5, 7). This is indicative of forest clearance.

Simmons (1969, 212) comments on the open land around the settlement and notes that it must have represented the major part of the grazing land available. To judge the extent of these clearings around each settlement by pollen analysis alone is difficult, if not impossible. But we could expect the most extensive clearance to take place within 1 km. of the site in view of the evidence presented by Chisholm (see above), for within this zone the land would be utilized more heavily for agricultural purposes. The dotted line on Map III encloses an area within 1 km. of the site. We can suppose the 'Outfield' to lie within this zone. Tillage of the 'Outfield' and grazing would prevent forest regeneration and help establish the permanence of the clearing.

We must now consider the distribution of the other essential elements of the economy.

Map III shows the site to be situated within convenient distance of a water supply, the lower fields of the settlement extending down to the Hayne Brook. The close proximity of a good water supply Chisholm sees as a major locational factor (Chisholm, 1968, 102).

Building material was everywhere readily available. The boulder-strewn slopes immediately above the site would have provided material with which to construct hut walls, field boundaries, etc., as would stones removed from fields, prior to cultivation.

In our study area, owing to the superabundance of stone, the availability of building material cannot have been an important locational factor.

Because of the constant need of fuel and its high transport costs Von Thunen placed forestry in his second landuse zone from the central city or farmstead. His zone of pastoral activity was further out (Grotewold, 1959, 350-351).

When we come to consider the distribution of fuel as regards the location of the settlement in our study area a lot depends, of course, on the size of the clearance and the distance of the forest edge from the settlement. If we assume the forest edge to be 1 km.

or more from the farmstead then the amount of time spent on the collection of fuel will have been substantial. However, there is the possibility that a fuel supply was found in woodland and scrub along the valley bottoms (see Map III). Blackburn (1954, 62) on the basis of pollen work at the Kestor site suggests that:

"as the streams leave the heights they may have hazel scrub and alder beside them."

In present times, the marshy valley bottoms on the fringe of the moor are often lightly wooded and are avoided by cattle and sheep, which graze on the rough moorland pasture higher up.

In view of the proximity of the site to the valleys, location of the fuel supply in them would be consistent with Von Thunen.

So we might see an 'Infield' represented by the enclosed fields, and a surrounding 'Outfield'. A fuel supply would have been found in nearby valleys and building material was everywhere available.

Grazing land would be available in the cleared area within 1 km. of the site and, depending on the size of the herd, this would have been sufficient. If the herd (or flock) was very large then the whole of the site catchment area would have been utilized, the herd being shifted as areas became overgrazed.

Simmons (1969, Fig. 3) has attempted a reconstruction of the forest. His map shows a heavily forested Bovey Valley.

The forest would have provided browse for livestock. In terms of economic usage, we might perhaps equate the forest of our site catchment area with the 'moor or waste' beyond the 'Outfield', which was characteristic of the Scottish Infield-Outfield system (Handley, 1953, 45).

In the Scottish system, however, the 'waste' was common to all tenants. If this were so in our study area then we could expect the site catchment area to be restricted to a zone with, say, 1 km. of the site. The area outside this zone would, then, be common to all — see Map III.

Geology

Any attempt to relate the site to geological conditions is uninformative. The O.S. Geological Map shows the geology of the Blissmoor Site Catchment area to consist of uniform granite, with only small areas of alluvium in the valleys of the Bovey and Hayne Brook.

Soils

The Soil Survey of England and Wales has not yet covered Dartmoor by systematic mapping. Recent work has been done on the Dartmoor soils, however, by Clayden and Manley (1964, 117).

Their map (1964, 122) shows the classification of the soils into three main groups.

The distribution of 'arable' settlements has been noted by Simmons to lie within the region of brown earth soils (Simmons, 1969, 209) and Clayden and Manley (1964, 134) observe that it is "extremely unlikely that the settled agriculture associated with enclosed

field systems could be successfully practised by primitive farmers on soils of the Hexworthy Series" (i.e. the peaty gleyed podzol soils).

This is all very generalized, however; Clayden and Manley's map shows the distribution of the 'main soil groups' and does not show transitional types etc. They themselves note how land-form and other factors will influence soil conditions (1964, 132) and locally render their general distribution map inaccurate. Forest clearance would have influenced soil conditions and the extent of local clearance would be important here in determining soil conditions.

In view of local factors then, it is difficult to say what the soil conditions were in the Blissmoor Site Catchment area.

Conclusions

This work rests on many assumptions. In constructing the site catchment area by Thiessen Analysis, the assumptions are being made that the distribution of settlements are contemporary and that Fox's distribution map — see Map I — is complete. Also the scant evidence for the economy and agricultural régime of the 'arable' settlements allows many interpretations.

In suggesting an 'Infield-Outfield' system, the assumption is being made that the settlements were permanent. Another interpretation would be to see them as summer shielings. This interpretation would depend on the assumption that the lowland areas surrounding the moor were occupied (traces of settlement having been since destroyed by agricultural processes etc. — the mutually exclusive distribution of the settlement remains and the modern enclosures seen on the Ordnance Survey 6 inch Series is certainly pertinent here). The undoubted evidence of cultivation need not upset the theory that these Bronze Age Settlements represent summer shielings. Miller (1967, 194) notes that in Scotland evidence of cultivation in the form of 'lazybeds' are often to be found around the shiels.

Kosse's evidence of manuring could also be explained with reference to the Scottish shielings. Miller (1967, 200) observes that quite often the shieling grounds are walled: "partly to restrain the stock at night for security and for convenience of milking and partly so that their dung might be concentrated on the shieling. Enclosure would also be necessary if a crop of corn or potatoes was taken when fertility had been built up sufficiently."

There are a number of objections to this idea of shielings that spring to mind. First in view of the extensive forest clearance seen on Dartmoor in the Bronze Age (Simmons, 1969, 205) and the continual pressure on the environment that this implies, would it be possible not to see permanent settlement of the area?

Secondly, I find the pottery evidence instructive. The pottery is not well made and is unlikely to have stood up to transportation from the 'home farm' to the shieling. Ethnographic examples of transhumant societies usually display a material culture with an emphasis on 'unbreakable' utensils. The pottery, I believe, argues for permanence of occupation.

Indeed, a shieling system could have been operated with the Dartmoor settlements as

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the 'home farms'. The additional summer grazing could have been found in the large areas of peat bog above 1500 feet (Simmons, 1969, Fig. 3). The inception of peat growth has been shown by Simmons to be referable to the beginning of zone VIIb (1962, 567) i.e. culturally either in the Neolithic or Bronze Age.

Hansford Worth, too, has observed that peat growth has occurred since the EBA. He notes that some of the stones of the Stall Moor stone row have been covered with a growth of peat up to two feet in depth (Hansford Worth, 1930, 64). Discussion of the reasons for peat growth lie beyond the scope of this work, but undoubtedly deforestation was a causal factor.

Today the high peat areas are grazed by cattle and sheep; it is not unreasonable to suppose they were of similar economic value in the Bronze Age.

There are, then, many possible alternatives which the evidence allows. In this work I can only claim to have presented a few of them.

Abstract

The Bronze Age 'arable' settlements of Eastern Dartmoor are studied in relation to their local resources. The study is made in accordance with Chisholm's contention that local resources — building materials, water supply etc. — will exert 'pulls' on the siting of any settlement.

One problem has been to relate the sites to the environment of the Bronze Age. To do this reference has been made to Simmons's pollen work from the Dartmoor bogs.

An attempt has been made to relate results to the principles of Von Thunen and the hypothesis is put forward that the agricultural régime of these sites paralleled that of the Scottish 'Infield-Outfield' system.

Using Thiessen Analysis, the site catchment area of one site (Blissmoor) is constructed.

In order to use Thiessen Analysis, the distribution of settlements have to be shown to be contemporary. This is attempted by archaeological methods.

REFERENCES

- Anati, E., 1964, *Carmonica Valley*, London: Jonathan Cape.
ApSimon, A. M., 1957-58, Cornish Bronze Age Pottery, *Proc. West Cornwall Field Club*, 2, No. 2, 36.
Baring-Gould, S., 1895, Second Report of the Dartmoor Exploration Committee, *Trans. Devonshire Assoc.*, 27, 81.
1896, Third Report of the Dartmoor Exploration Committee, *Trans. Devonshire Assoc.*, 28, 174.
1897, Fourth Report of the Dartmoor Exploration Committee, *Trans. Devonshire Assoc.*, 29, 145.
Barker, G., 1972, The conditions of cultural and economic growth in the Bronze Age of Central Italy, *Proc. Prehistoric Society*, 38, 170.
Blackburn, K. B., 1954, in Fox, A., 1954, Excavations at Kestor, *Trans. Devonshire Assoc.*, 86, 61.
Bowen, H. C., 1961, *Ancient Fields*, London: British Association for the Advancement of Science.
Cambridge Economic History of Europe, 1966, 2nd Edn. *The Agrarian Life of Middle Ages*, Vol. 1, Postan, M. M., (ed.): Cambridge University Press.
Chisholm, M., 1968, *Rural Settlement and Land Use*, London: Hutchinson.
Clayden, B., and Manley, D. J. R., 1964, *The Soils of the Dartmoor granite*, in, *Dartmoor Essays*, 161, published by the Devonshire Association for the Advancement of Science, Literature and Art.
Curwen, E. C., 1927, Prehistoric Agriculture in Britain, *Antiquity*, I, 261.
Curwen, E. C., 1946, *Plough and Pasture*, London: Cobbett Press.

- Edmonds, E. A., McKeown, M. C., Williams, M., 1969, *British Regional Geology, South-west England*, 3rd Edn., London: H.M.S.O.
- Ellison, A., and Harriss, J., 1972, *Settlement and land use in the prehistory and early history of Southern England: a study based on locational models*, in, *Models in Archaeology*, 911., Clarke, D. L., (ed.) London: Methuen.
- Fleming, A., 1971, Bronze Age agriculture on the marginal lands of North-east Yorkshire, *Agricultural History Review*, 19, 1.
- Fowler, P. J., 1971, *Early prehistoric agriculture in Western Europe: some archaeological evidence*, in, Simpson, D. D. A., 153, *Economy and Settlement in Neolithic and Early Bronze Age Britain and Europe*, Leicester: University Press.
- Fox, A., 1954a, Celtic fields and farms on Dartmoor in the light of recent excavations at Kestor, *Proc. Prehistoric Society*, 20, 87.
- Fox, A., 1954b, Excavations at Kestor, An early Iron Age settlement near Chagford, Devon, *Trans. Devonshire Assoc.*, 86, 21.
- Fox, A., 1957, Excavations on Dean Moor, in the Avon Valley 1954-1956, *Trans. Devonshire Assoc.*, 89, 18.
- Fox, A., 1964, *South-west England*, London: Thames and Hudson.
- Fox, A., and Britton, D., 1969, A Continental Palstave from the Ancient Field System on Horridge Common, Dartmoor, *Proc. Prehistoric Society*, 35, 220.
- Garner, B. J., 1967, *Models of Urban Geography and Settlement Location*, in, *Models in Geography*, 303, Chorley, R. J., and Hagget, P., (eds) London: Methuen.
- Gill, C., (ed) 1970, *Dartmoor: a new study*, Newton Abbot: David and Charles.
- Grotewold, A., 1959, Von Thunen in Retrospect, *Economic Geography*, 35, 346.
- Haggett, P., 1965, *Locational Analysis in Human Geography*, London: Edward Arnold.
- Handley, J. E., 1953, *Scottish Farming in the eighteenth century*, London: Faber and Faber.
- Hansford Worth, R., 1930, Address of the President, *Trans. Devonshire Assoc.*, 62, 49.
- Hansford Worth, R., 1937, Dartmoor Exploration Committee, Thirteenth Report, *Trans. Devonshire Assoc.*, 69, 143.
- Helbaek, H., 1952, Early Crops in Southern England, *Proc. Prehistoric Society*, 18, 194.
- Hudson, J. C., 1969, A location theory for rural settlement, *Annals of the Association of American Geographers*, 59, 365.
- Jarman, M. R., Vita-Finzi, C., Higgs, E. S., 1972, *Site Catchment analysis in archaeology*, in, *Man, Settlement and Urbanism*, 61, Ucko, P. J., Tringham, R., Dimbleby, G. W., (eds.) London: Duckworth.
- Kosse, A., Unpublished Mss.
- Megaw, J. V. S., Thomas, A. C., Wailes, B., 1960-61, The Bronze Age settlement at Gwithian, Cornwall, *Proc. West Cornwall Field Club*, 2, No. 5., 200.
- Miller, R., 1967, Land use by summer shielings, *Scottish Studies*, 11, 193.
- Odum, E. P., 1959, *Fundamentals of Ecology*, (2nd Edn.) Philadelphia: W. B. Saunders.
- Orwin, C. S., and C. S., 1954, 2nd Edn., *The Open Fields*, Oxford: Clarendon Press.
- Radford, C. A. R., 1952, Prehistoric settlements on Dartmoor and the Cornish Moors, *Proc. Prehistoric Society*, 18, 55.
- Reed, R. C., 1970, Ph.D. Thesis, University of London, Ch. IX, *Cornish Middle Bronze Age Pottery*.
- Shirlaw, D. W. G., 1966, *An Agricultural Geography of Great Britain*, Oxford: Pergamon Press.
- Simmons, I. G., 1962, An Outline of the Vegetation History of Dartmoor, *Trans. Devonshire Assoc.*, 94, 555.
- Simmons, I. G., 1964, Pollen diagrams from Dartmoor, *New Phytologist*, 63, 165.
- Simmons, I. G., 1969, Environment and Early Man on Dartmoor, Devon, England, *Proc. Prehistoric Society*, 35, 203.
- Thomas, A. C., 1969, The Bronze Age in the south-west, *Archaeological Review*, 4, 3.
- Van Bath, B. H. S., 1963, *The Agrarian History of Western Europe, AD 500-1850*, London: Edward Arnold.

Assessing the Botanical Component of Human Paleo-Economies

by R. N. L. B. HUBBARD

Some of the major objectives of archaeo-botanical research are the reconstruction of the generalities of economy and agricultural practice, and the study of their changes in space and time, and between different cultures. Crucial to this clearly, is the existence of an acceptable method of quantification.

Given a block of homogeneous data, such as a sample of carbonised seeds, the obvious method of quantification is to express the importance of the individual components as percentages of the whole assembly, either on a numerical or a weight basis. For economic interpretation weight-percentages are more sensible, but are often impossible to determine. In any case, this simple approach is unacceptable since the composition of such samples is severely influenced by archaeological context, and is very unlikely to represent the parental palaeo-economy accurately. Moreover, this method cannot handle heterogeneous data. A more sophisticated treatment of quantification is necessary. So far, two such approaches have been tried. J. M. Renfrew (in Renfrew, A. C. 1972, 276) has synthesised her results from Sitagroi by expressing, as a percentage of the total number of samples belonging to a given period, the number of samples in which a given taxon is dominant. The basic assumption is that the frequency with which a certain plant will outnumber the other constituents in a group of samples will be related to the frequency of its use: this seems not unreasonable, although one would expect that it would favour the major crop-plants at the expense of minor economic groups such as spices and fruit. Since the percentages of the individual taxa are supplementary, their sum being 100%, this particular treatment ought to have the advantage of summarising the entire botanical aspect of a palaeo-economy. On the other hand, it is not convenient for handling data other than samples of carbonised seeds, and still less satisfactory for mixing and synthesising heterogeneous groups of data. Another disadvantage is the fact that the method depends upon the composition of individual samples. Different methods of preparing seed samples have differing extraction efficiencies which can introduce biases — for instance, seeds of the Leguminosae (pulses) are disposed to sink in flotation extraction, while *Cornus mas* (cornel) and *Linum* (flax) are very buoyant. Reproducibility and comparability of data are likely to pose problems for general application of this treatment.

The second method of quantitative synthesis employs Brockmann-Jerosch's concept

of 'Presence' (Braun-Blanquet, 1932, 52). In this, taxa are scored simply as present/absent in individual samples, regardless of abundance, and the frequency of a taxon (its 'Presence') is the number of samples in which it is scored as present, expressed as a percentage of the total number of samples in the chronological, geographical or cultural groups under examination. Thus the Presence of a taxon can vary between 0% (not recorded) to 100% (present in every sample), and the sum of the Presences of the taxa within a group need not be 100% — indeed, it will probably be much greater. The fundamental postulate involved is that the frequency with which a plant is encountered in a group of samples will be proportional to the frequency of its use. This seems unexceptionable, except that a bias in favour of minor components might be expected when samples are large. As the percentages of the taxa are not supplementary, the treatment does not directly summarise the economy; but it may, on the other hand, give some indications of absolute prosperity. It must be remembered that in Presence-analysis equal weight is given to the occurrence of a single specimen as that of 100 specimens; and equal weight to absence whether the sample is minute or gigantic. However, this same crudeness of approach is also the great strength of Presence-analysis, since it allows both the comparison of data of very different quality and the comparison on an equal footing of very heterogeneous material. This flexibility would seem to have considerable potential in archaeology.

The use of presence-analysis to synthesise botanical palaeo-economic data was pioneered by Godwin (1956) in summarising the work of Jessen and Helbaek (1944) and of Helbaek (1953); but has subsequently been neglected, although it has been used in charcoal analysis. The problem faced by Godwin was the unification of a corpus of material that included analyses of samples of carbonised seeds numbering several hundred specimens as well as studies of pottery impressions that gave 1-32 identifications per site, for 10 (early Neolithic) to 62 sites (middle Bronze Age) per period. Since almost no comparable work has been done on prehistoric British agriculture in the last twenty years, it is not possible to carry out a direct test on Godwin's results; but in Fig 1, Helbaek and Jessen's data, augmented by data from Early Medieval York (Buckland, Greig and Kenward, 1974) and Ewen (Hubbard, in preparation) are plotted (dotted lines) against data for the Netherlands (van Zeist, 1970, Table 63). Van Zeist's comparative data consist of analyses of samples comprising several hundred to several thousand seeds, from four (early Iron Age) to sixteen sites per period.

Since the British data are largely based on pottery-impressions, correlation with the Dutch data cannot be expected for the pulses, acorns and hazel nuts. In other respects, the degree of correlation between the graphs is indisputable, and proves that whatever the theoretical flaws and the inadequacies of the data, presence-analysis, as a method, is valid. The fact that (for example) *Triticum spelta* seems to appear earlier in Britain than on the continent, merely reflects ambiguities in the archaeological taxonomy; some of early Iron Age in the Netherlands corresponds to late Bronze Age in Britain, etc.

Bearing in mind the degree of correlation between the curves for Bread wheat, spelt, naked and hulled six-row barley, and oats, the divergencies for the emmer and *Panicum*

ASSESSING THE BOTANICAL COMPONENTS OF HUMAN PALAEO-ECONOMIES

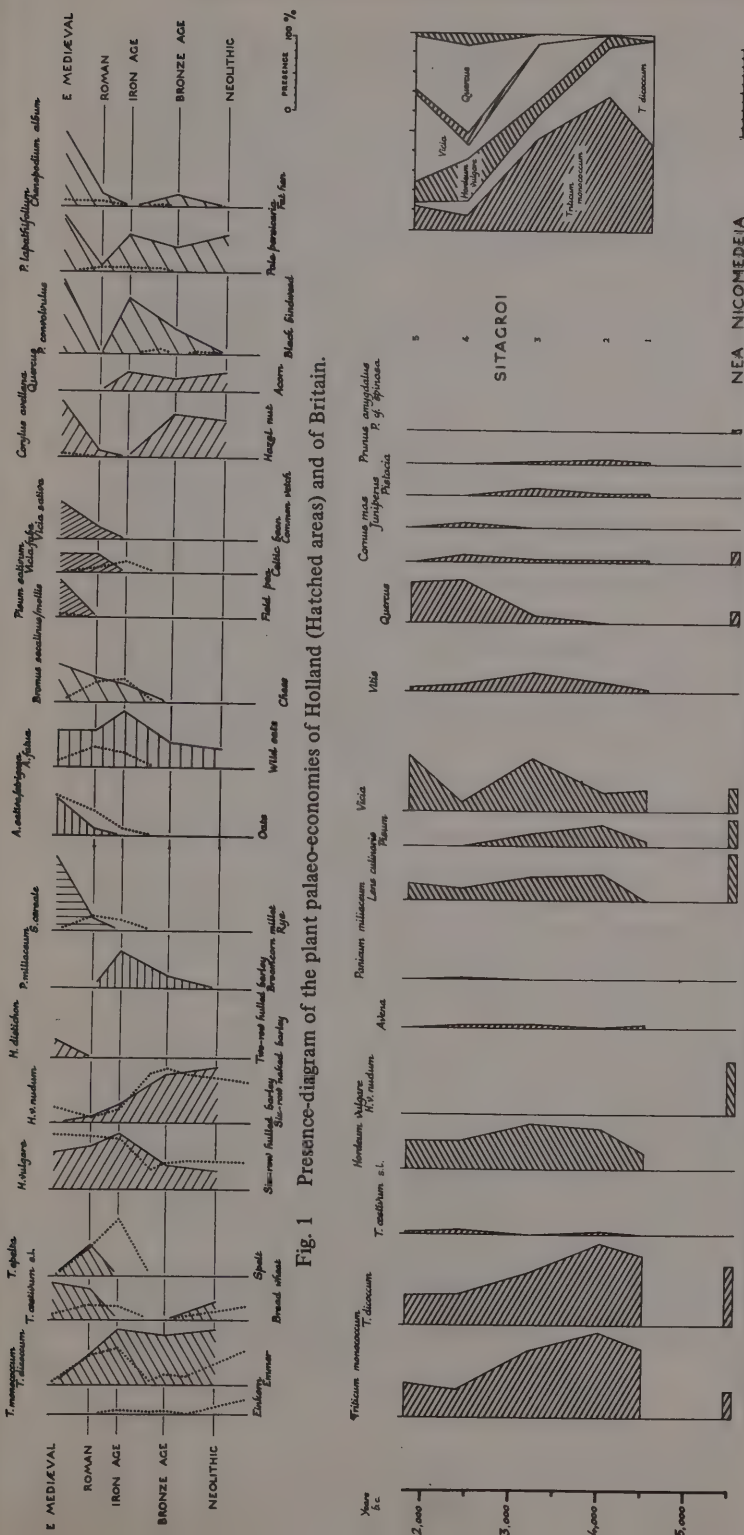


Fig. 1 Presence-diagram of the plant palaeo-economies of Holland (Hatched areas) and of Britain.

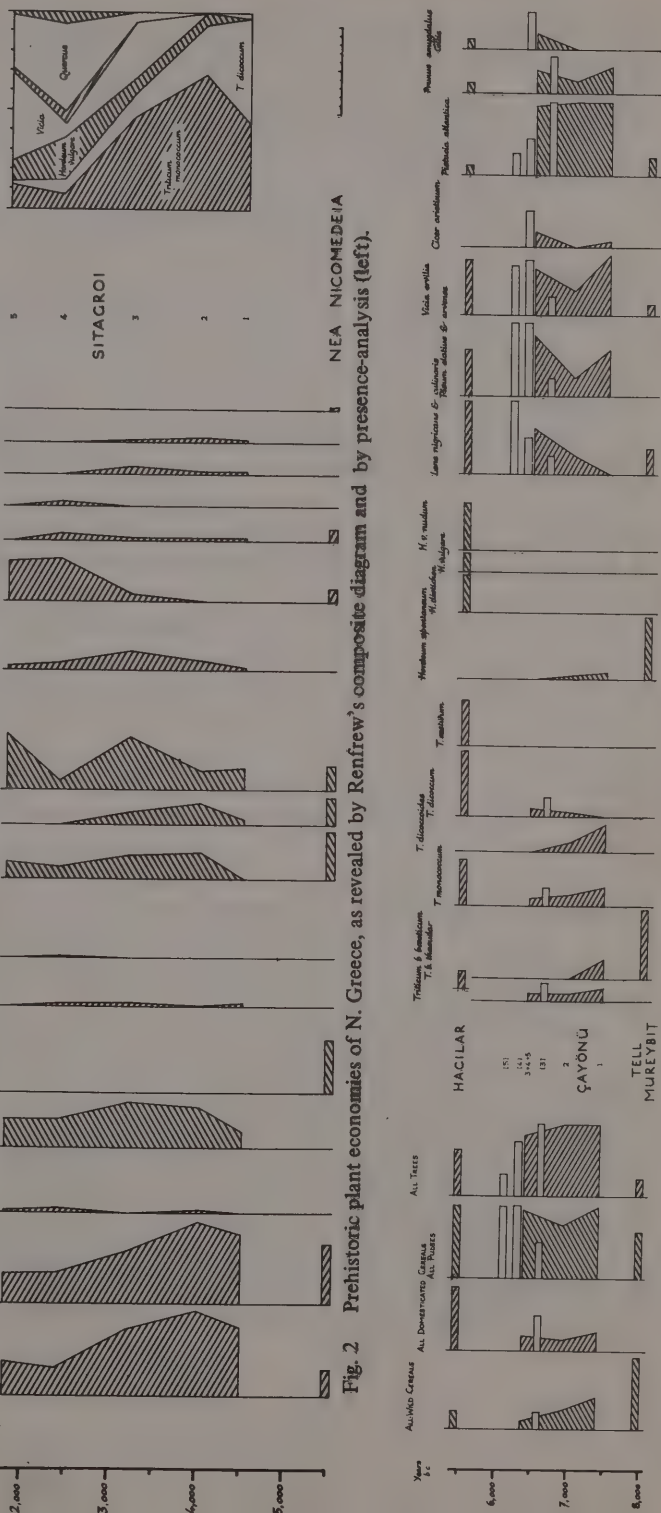


Fig. 2 Prehistoric plant economies of N. Greece, as revealed by Renfrew's composite diagram and by presence-analysis (left).

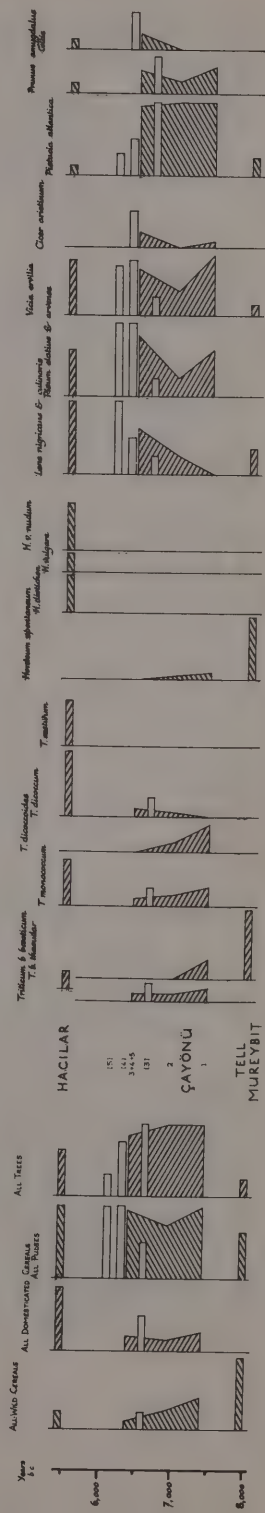


Fig. 3 The genesis of Near Eastern agriculture, illustrated by the palaeo-economies of Tell Mureybit, Çayönü Tepesi and chalcolithic Hacilar.

miliaceum curves are striking. The absence of *Panicum* from prehistoric Britain was recognised and commented upon by Helbaek (1953, 212-3): since it can be grown satisfactorily in this country, the difference must be attributed to cultural traditions, or as Helbaek suggested, cultural origins. The anomalous behaviour of the emmer curves, however, seems to have quite another origin. The apparent sharp decrease in use of emmer during the Bronze Age in Britain was tentatively interpreted by Godwin (1956, 262-4) in terms of the supposed drier climate during the Fl. VIIb (sub-Boreal) pollen zone. The few grain deposits examined by Jessen and Helbaek that probably belonged to the Bronze Age, contained substantial proportions of emmer, and the difference seems to lie in the fact that the British data are based almost exclusively upon pottery impressions, whilst the continental data are based on the seeds themselves. If this interpretation is correct, one would predict that when more information about British Bronze Age carbonised seeds becomes available, the results will be comparable with the data of van Zeist rather than with those of Helbaek and Jessen. Work in progress on material from Grimes' Graves seems to support this prediction (A. J. Legge, personal communication). The divergence between the emmer curves would seem to be artificial, caused by a cultural trait, either in crop-processing or in pottery manufacture, that caused wheat to be systematically excluded from pottery. Perhaps barley was used as animal fodder, as it is today, and was stored less carefully than wheat and was accordingly more frequently incorporated into pottery. Equally, wheat chaff may have been separated for some special use. Whatever the mechanism, it appears to have been inoperative during Iron Age and Roman times, but perhaps in action once more (at the expense of bread wheat) in Anglo-Saxon times. As a cultural trait that could not be discovered by traditional archaeological methods it makes coupled seed and seed-impression analyses more desirable than ever. Moreover, the sources of seed impressions will need to be documented in case of systematic differences between pottery types – which would carry interesting implications.

It is extremely interesting to find that the 'hole' in the bread wheat graph is confirmed by van Zeist's data: Prof. G. W. Dimbleby has suggested (personal communication) that the two halves of the curve may represent the decline and extinction of a Neolithic cultivar, and the introduction of a new race, perhaps better suited to a Northern European climate, during the late Iron Age.

Another most important observation that can be made from Fig 1, is the distinction between the regular curves of the cereals, their weeds and the other field crops; and the erratic curves for acorn and hazel (which can be assumed to be uncultivated for present purposes) and *Polygonum convolvulus*, *P. lapathifolium*, and *Chenopodium album*, whose domestic status have sometimes been debated. It is perhaps significant that Helbaek and Jessen observed only one impression of *P. convolvulus* in their studies of pottery, although the seeds are comparable in size to those of the cereals.

The displacement of naked six-row barley by the hulled form during the Iron Age is at present unexplained: it is tempting to hypothesise differences in malting properties, and the foundation of the great tradition of beer-drinking during the Celtic invasions; but

it is *Hordeum distichon*, followed by *H. vulgare nudum*, that is best for brewing.

As a last comment concerning this diagram, *Bromus secalinus* deserves attention. Helbaek (1953, 211, 220) and Godwin (1956, 342) hold that this grass is a weed; and Helbaek suggests that it was associated with the cultivation of spelt. However, van Zeist's data show no correlation between the chess curve and that of spelt or any other cereal; nor does it compare with the curves for *Chenopodium album* or the Polygonaceae. Since it is not generally held to be a native plant of N. W. Europe, the implication seems to be that it was cultivated as a field crop.

In Fig. 2, J. M. Renfrew's analyses of the material from Sitagroi are presented in the form of a presence-diagram; and are compared with her original presentation, (Renfrew, A. C. 1972, 276), and with data for Nea Nicomedeia published by van Zeist and Bottema (1971). In the construction of this diagram, two assumptions have been made: firstly that all of the material from Nea Nicomedeia belongs to the Early Neolithic part of the site; and secondly that the six-row barley from Sitagroi is all of the hulled form (although to judge by sites elsewhere, the naked form is of comparable importance in the Neolithic, and perhaps more important in the Bronze Age).

While the general picture shown by the presence-diagram is comparable with that from Dr. Renfrew's synthesis, three points of difference are immediately clear. The first is that there appears to be little significant change in the importance of barley during the lifetime of the settlement, and although it increases in importance relative to the wheats, in absolute terms it only attains parity. The contribution of lentils to the economy of Sitagroi seems to be severely under-represented in Dr. Renfrew's diagram (the hatched area between the *Vicia* and *Quercus* curves): the presence-curve indicates that lentils were an important item of diet during most of the span of the settlement, and since they seem to have been even more important at Nea Nicomedeia, it is improbable that they were totally unknown during the earliest occupation at Sitagroi. The third divergence is that the presence-analysis indicates no significant difference in importance between einkorn and emmer, where Dr. Renfrew's diagram suggests that einkorn is dominant except in the earliest phase at Sitagroi. The similarity between the presence curves for einkorn and emmer is remarkable, and suggests the closest possible agricultural relationship between these wheats. The contrast with their behaviour in N. W. Europe is also unmistakable, and implies either that a thousand or more years of cultivation in the climate of Northern Europe was sufficient to cause an almost complete displacement of einkorn by emmer; or that long before 2,000 b.c., einkorn and emmer were being grown as separate crops, and that it was the latter that was adopted in N.W. Europe. The former interpretation seems improbable, since einkorn grows perfectly satisfactorily in this country. It is interesting to find a quite marked differentiation between einkorn and emmer at Nea Nicomedeia, fully a thousand years before the earliest occupation of the tell at Sitagroi.

The fact that only naked six-row barley was found at Nea Nicomedeia is remarkable, since among the aceramic sites of Thessaly both naked and hulled barleys were identified (Renfrew, 1966) — a more normal state of affairs. There must surely be some good reason for such a marked specialisation, but at present it remains totally obscure.

The curves for hexaploid wheat (*Triticum aestivum*, *sensu lato*), oats, and *Panicum miliaceum* are singularly featureless. In the case of *Panicum*, the scarcity is because the plant is apparently a late and rare addition to the agricultural repertoire; but in the other cases, it suggests that the plants were not being cultivated *per se*. A comparison of the curves for *Avena* species in Figs. 1 and 2 yields no evidence for the cultivation of oats in Thrace before 2,000 b.c. This throws valuable light on the status of the Achilleion oat, which Renfrew has on one occasion (1969, 154) suggested was domesticated: it is probably *Avena sterilis* L. to judge by its size.

The irregularity of the curve for *Vicia* species at Sitagroi is very striking, and is reminiscent of the curves for the 'collected plants' in Fig. 1. There are strong reasons to believe however that *Vicia ervilia* and *Lathyrus sativus* at least, were being cultivated in Neolithic Greece. It must therefore be asked whether some sampling error is involved. A conflagration in a prosperous timber-and-daub built agricultural settlement such as Sitagroi causes the widespread dissemination of an innocuous-looking destruction débris bearing an astonishing concentration of carbonised seeds. It is thus possible to take a number of widely spaced samples that sample one feature only. Sampling has to be very carefully planned in the vicinity of a major destruction, and of course, the smaller the excavated area, the greater the problems. It should be possible to assess the reliability of the *Vicia* curve by comparison with the behaviour of the curves for the Polygonaceae, Chenopodiaceae, and other 'collected plants' when the relevant data are published.

Viewed overall, the major impression of the palaeo-economies at Sitagroi as depicted by the presence-diagram, is one of continuity. If it were to be sub-divided in the manner of a pollen-diagram, the first division would be made between phases 3 and 4, on the basis of the disappearance of *Pisum*, and the high and low incidences of acorns and wheat respectively – whatever these latter mean. This division is paralleled in the pattern of animal husbandry, where Bökönyi's work (Renfrew, A. C., 1972; 279) suggests that cattle and swine exchange rôles and that wild animals increase slightly in importance between these two phases. That both the botanical and zoological records alter synchronously is not likely to be accidental, and indicates that unrepresentative sampling need not be invoked in this case. The economic zonation corresponds, of course, to the late Neolithic/early Bronze Age transition. A second division might separate Sitagroi 1 from phase 2 on the basis of the initial absence of lentils from the economy: I have already recorded my suspicions that this is spurious. No further sub-divisions seem justifiable.

It is enlightening to compare the economies that have been discussed so far, with those of Çayönü Tepesi (van Zeist, 1972) and Tell Mureybit (van Zeist, 1970a). In Fig. 3, data for these sites are compared with those for chalcolithic Hacilar published by Helbaek (1970), to give a glimpse of the genesis of our agricultural system. Before discussing Fig. 3, several cautions need to be given. Firstly, the three sites are widely separated and ecologically disparate. Mureybit is on the banks of the Euphrates in the steppes of Syria, whereas the other sites are situated in hilly country that originally would have carried large areas of forest. Thus wild barley (*Hordeum spontaneum*) would be expected to be common at Tell Mureybit, and rare or absent at Hacilar; while the fruits of trees ought to

be far more abundant at Hacılar and Çayönü than at Mureybit, where the charcoal gave van Zeist evidence for only a thin strip of poplar, tamarisk, and ash forest bordering the river. Secondly, some of the data are on the lower limit of statistical viability. Only eight samples from Hacılar were amenable to presence-analysis, although they are rich; and at Çayönü preservation of carbonised material was poor in the three upper layers. In constructing Fig. 3, the calculated presences for the individual phases 3, 4, and 5 at Çayönü have been indicated by white bars, since only 3-4 samples can be assigned to each phase. The data from these upper levels have been combined in drawing the hatched curve in order to give figures that are comparable with those from phases 1 and 2 (11 and 19 samples respectively).

In his palaeo-botanical report on Çayönü, van Zeist was largely concerned with the agricultural aspects of the settlement, and in particular with its bearing on the origins of einkorn and pea domestication. What emerges from the presence-diagram is a picture of a community where the collection of tree-fruits and the cultivation or collection of pulses was of far greater economic importance than the cultivation of cereals. The fact that there appears to be a dip in most of the pulse curves at level 2 need not be taken very seriously, since the effect is so general that it suggests misrepresentative sampling of some kind. In the uppermost two levels at Çayönü, no cereal grains were found at all, but quite large numbers of pulses were recovered: although this might be spurious, arising from differential destruction of Gramineae and Leguminosae seeds in the layers nearest the surface, a specialisation on pulse agriculture and an abandonment of cereal crops seems to be indicated. At present, such an economy would have no known parallel.

In the general context of the development of agriculture, or the evolution of the domestic plants, Çayönü clearly occupies an intermediate position between the proto-agriculture or intensive collection of Tell Mureybit, and the fully developed agricultural system of Hacılar, consistent with the traditional view of the birth of agriculture. A gradual decline in the incidence of wild cereal forms during this period is clear, although a corresponding increase of domesticated forms can be only detected in the most crude form in the 'All domesticated cereals' graph, and in the *Triticum dicoccoides-dicoccum* system at Çayönü — perhaps merely by a happy coincidence. Considered in the light of Fig. 3, recent reports by Dennell (1973) of *Triticum dicoccum* from deposits in Palestine that are some 8,000 years earlier than Tell Mureybit, seem thoroughly anomalous. A confusion with seeds of the *Aegilops* grasses may be responsible, since the size and morphology of the caryopses of several species of this genus resemble those of *Triticum dicoccum*.

Comparison of Figs. 2 and 3 demonstrates quite clearly — if proof were needed — that the earliest agriculture of Europe was imported. Bearing in mind the limitations of the data, the botanical palaeo-economy of Hacılar is comparable (with the exception of the presence of quantities of bread wheat and wild einkorn) with that of the early Neolithic of Greece. Although a native, rather than segetal status for *Triticum boeoticum* in the Balkans has been contemplated by Stearn (1965, 286), it can hardly be accidental that so far no archaeological record of wild einkorn exists outside Western Asia; and certainly no

European site can produce figures comparable with the overall presences for wild and domesticated cereal types at Çayönü of 27% and 20% respectively.

In the three cases discussed, the chronological and geographical resolution has, of necessity, been very coarse. The form of the graphs suggests that improved chronological detail will be of less importance than greater regional detail. Our current knowledge indicates that the evolution of Neolithic economies in the Near East, in particular, displayed considerable regional variation.

In common with pollen-diagrams, presence-diagrams summarising botanical economic data will suffer from systematic under-representation of certain classes. Tubers and salad plants are unlikely ever to be recorded, and plants like *Rubus* spp. (blackberry and raspberry) and *Linum* are usually only erratically recorded. A presence curve for *Linum* in Fig. 1 would not exceed 11% presence, and records total absence for the middle and late Bronze and Iron Ages; but to deduce that it was of less importance than acorns, and that for a millennium flax and linseed oil were unknown in N.W. Europe, would be most unwise. The fact that emmer, einkorn and spelt need to be parched before threshing may introduce another systematic bias among the cereals.

Finally, first-hand experience is important in the interpretation of a presence-diagram, and might resolve (for example) the interpretational ambiguity of a narrow presence curve that could either indicate a minor but important economic component, or a rare 'erratic' whose contribution was negligible.

Amongst others too numerous to name, I would like to thank G. W. Dimbleby, F. R. Hodson, H. C. Ridley, and S. E. Paton for their trenchant criticisms.

Abstract:

After reviewing methods for synthesising archaeo-botanical data, graphical representations of the botanical palaeo-economies of N.W. Europe, Northern Greece, and the Near East are discussed. The Neolithic bread wheat of Northern Europe appears to have been a different cultivar from that of later times; and it is suggested that chess (*Bromus secalinus*) may be a 'lost' crop plant. The shape of the graphs suggests a distinction between 'field crops' and 'collected plants'. The evidence of plant impressions in pottery is sometimes unrepresentative of the palaeo-economy. The agricultural economy of N. Greece appears to have altered significantly only between Neolithic and Bronze Age times. Evidence is found for the cultivation of pure crops of einkorn, emmer, and barley prior to 5,000 b.c. The diagram representing the earliest Neolithic phases in the Near East supports the traditional view of the emergence of agriculture; but suggests that Çayönü may have evolved away from cereal agriculture and specialised in pulse crops.

REFERENCES

- Braun-Blanquet, J. transl. Fuller and Conard, 1932, *Plant Sociology: the Study of Plant Communities*, New York & London.
- Buckland, P. C. et al, 1974, "York: an Early Medieval Site", *Antiquity* 48, 25-33.
- Dennell, R. W. 1973, in Noy, T. et al. "Recent excavations at Nahal Oren, Israel". *Proc. Prehist. Soc.*, 39, 75-99.
- Godwin, H. 1956, *The History of the British Flora*, Cambridge University Press.
- Helbaek, H. 1953, "Early Crops in Southern England", *Proc. Prehist. Soc.* 18, 194-233.
- Helbaek, H. 1970, "The Plant Husbandry of Hacilar" in J. Mellaart *Excavations at Hacilar* 1, 189-244. Edinburgh University Press.
- Jessen, K. & Helbaek H. 1944, "Cereals in Great Britain and Ireland in Prehistoric and Early Historic Times", *Kongelige Danske Videnskabernes Selskab, Biologiske Skrifter*, 3 (2).
- Renfrew, A. C. 1972 *The Emergence of Civilisation*, London.
- Renfrew, J. M. 1966 "A report on recent finds of carbonised cereal grains and seeds from prehistoric Thessaly", *Thessalika* 5, 21-36.
- Renfrew, J. M. 1969, "The archaeological evidence for the domestication of plants: methods and problems" in P. J. Ucko & G. W. Dimbleby (eds.) *The domestication and exploitation of plants and animals*, London 149-172.
- Stearn, W. T. 1965, "The origins and later development of cultivated plants", *J. Royal Hort. Soc.* 90, 279-91, 322-40, 520.
- van Zeist, W. 1970 "Prehistoric and Early Historic Food Plants in the Netherlands" *Palaeohistoria* 14, 41-173.
- van Zeist, W. 1970a, "The Oriental Institute Excavations at Mureybit, Syria: Preliminary report on the 1965 campaign; Part III: The Palaeobotany", *J. Near Eastern Stud.* 29, 167-176.
- van Zeist W. & Bottema S, 1971 "Plant Husbandry in Early Neolithic Nea Nikomedeia, Greece", *Acta Bot. Neerl.* 20, 524-538.
- van Zeist, W. 1972, "Palaeobotanical Results of the 1970 season at Çayönü, Turkey", *Helenium* 12, 1-19.

Summaries of M.A. and M.Sc. Reports

1973/74

A Topographic Survey of the Gravina River Valley, between Gravina and Matera, South Italy.

This report sets out the results of a survey carried out by the author during the summer of 1972. It was part of a comprehensive project (under the supervision of Professor J. B. Ward-Perkins) to survey the entire Bradano Trough.

Chapter I discusses very briefly the topography of the area since Neolithic times. The importance of the Gravina valley as a communication route leading both north and south is emphasized. The valley has been inhabited since the Neolithic period, and well-known sites within the area of the survey are mentioned.

Chapter II contains the Catalogue of Sites. After describing their situation, the significant artefacts from each site are described at length (this section includes extensive drawings and photographs of the artefacts). Whenever possible, comparisons were made with similar objects from other sites, museums, or publications dealing with South Italian cultures.

Twenty-five sites were discovered and examined by the author during the course of the survey. They range in date from Neolithic to Medieval. A map shows the distribution of the sites along the Gravina River Valley.

It is hoped that the survey, besides filling in the archaeological map in this area of South Italy, has pointed out the urgency for rescue excavation here before these and many other sites are totally destroyed by a combination of modern agricultural techniques and illicit excavation.

D. D. Aldridge

Pollen Analysis at Cornish Barrow Sites

Pollen analyses from three Bronze Age sites on the St. Austell granite, Caerloggas, Watch Hill and Greensplatt, are recorded and discussed. They are also compared with pollen analyses from other Cornish sites, especially that from Cocksbarrow which is part of the same group.

The close proximity of the barrows allows direct comparisons to be made between them and also permits a relative chronology to be constructed for the group. This is an important function of the pollen analyses as most of the barrows have not been dated as they contained no suitable archaeological material. The changing proportions of tree and non-tree pollen put Cocksbarrow as the earliest, followed by Caerloggas I and III and Watch Hill which were vegetationally too similar to be separated, and finally Greensplatt as the latest.

All the pollen diagrams show the mosaic of woods and open land which succeeded the high forest and in its turn gave way to even more open conditions. This is consistent with other pollen analyses of the Bronze Age period throughout the country.

Justine Bayley

Copper/Bronze work of Early Bronze Age periods in Palestine

In order to understand the metal industries of the ancient Levant it is essential that the range of known types and their distribution is fully understood. Without this, studies based on the technological aspects of metallurgy would be of little value. Thus, wherever possible, typological classifications should be proposed.

Unfortunately the Northern material is insufficient for this purpose. At Byblos there is a body of material from the temple deposits including lances, spearheads and several types of dagger, much of which comes from those found in the 'Champs d'Offrandes'. These can be arranged in a broad chronological sequence according to the relative numbers of daggers they contain.

Very little material has been adequately published from other Northern sites; most examples, however, have parallels at Byblos.

In Palestine the daggers fall into seven classes based on type of butt, the form of midrib and the number of rivets employed, all of which reflect differences in workshop technique.

The javelins can also be divided into classes, some of which may illustrate a typological development culminating in the long bladed type from the North of Palestine, but the spearheads and fenestrated axes are poorly represented.

M. P. Bidmead

Domestic Architecture in the Early Bronze Age of Palestine

This paper constitutes an assembly and analysis of architecture in the Early Bronze Age of Palestine which is neither military, governmental, religious, commercial nor industrial.

The forms of these houses may be broken down thus:

- 1) Simple Type
 - a) Round Houses
 - b) Apsidal-Ended Houses
 - c) Broad-Roomed Houses
 - d) Broad-Roomed Houses with Auxiliary Room and Walled Courtyard
- 2) Complex Type
 - a) Two or more Connected Broad-Rooms
 - b) True Multi-Roomed Houses

(This scheme is neither chronological nor evolutionary in nature).

Analysis of the structure of these houses shows the techniques to have been advanced, with use of mud-brick on stone foundations and extensive, sophisticated carpentry.

Examination of the plans of these houses shows that a number of the sub types were present in Palestine in the Chalcolithic Period, although the relation of those earlier examples to the Proto-Urban and Early Bronze Age examples remains problematical.

Clearly these various types and sub types of houses may yield much information as to the nature and development of Early Bronze Age society, as excavations add to our knowledge of this period.

Rupert L. Chapman

A Study of the Fan-scraper

The fan-scraper is directly related to the Canaanite flaked stone industry. It is made from tabular flint, and its production is governed by the technique employed. Although it is the characteristic implement of the Ghassulian, it is by no means restricted to this culture. It has a geographical distribution ranging from northern Iraq to Maadi in the Nile Delta, but the biggest concentration seems to be in southern Palestine. This may be linked up with the availability of tabular flint. Though previously thought to have been a new element within a new industry, it is now possible that it evolved from the Late Neolithic tabular flint knife or scraper. Its own evolution seems to have been from the heavier thicker to the finer thinner, as evidenced by the implements found on the Wadi Ghazze sites. In the Early Bronze the form tends to be more oval than 'fan'-shaped. The true 'fan'-shaped scraper appears first in the Chalcolithic and continues into the Early Bronze when it gradually dies out. Some fan-scrappers bear inscriptions, but their significance can not be determined. Its value as meaningful evidence is linked with the Canaanite Industry taken as a whole.

J. R. L. Duckworth

The Evidence of Attic Pottery for Trade Between Athens and Etruria

Our evidence for trade between Athens and Etruria is composed almost entirely of the Attic vase found in Etruria. This Report is a preliminary statistical analysis of the vases. In the first two chapters the nature of the evidence is discussed, and the assumptions which underly any conclusions drawn from it. The question of sample error is important here, as are the types of method which may be used.

The last two chapters are two separate studies of the vases with Etruscan provenances in J. D. Beazley's *Attic Black-Figure Vases* and *Attic Red Figure Vases*. In the first they are treated quantitatively. Vases in the various cities at each period are counted, and then adjusted import curves are compared. It is discovered that imports in the Tiber cities show a different pattern from those on the coast, and possible explanations for this are discussed. The imports in Campania and the Po Plain are treated separately.

The last chapter is an analysis of the frequencies in which certain painters are represented in assemblages in different areas. The information which emerges from this study is then applied to a brief investigation of the trading patterns in the Adriatic and Tyrrhenian seas. Finally, other uses for statistical treatments of the vases are suggested.

Elizabeth W. B. Fentress

A study of the Kenya Capsian of Gamble's Cave (Kenya) and its comparison with other industries

The bottom of the layer of Gamble's Cave (Kenya) containing the "Kenya Capsian" has been dated to between 8000 and 8500 B.P., establishing definitely the Epipalaeolithic position of this industry. Some problems relating to the material of Gamble's Cave have been evoked, and a qualitative and quantitative study of the industry has been carried out with the aim of verifying the value of the name "Kenya Capsian" as applied to this industry by Leakey (1952).

The cumulative graphs corresponding to the two levels of Gamble's Cave have been constructed and compared with the cumulative graphs of Typical Capsian sites from North Africa. The same comparison has been made with the Upper Capsian sites. From these comparisons it seems as if the industry of Gamble's Cave has more similarities with the Typical Capsian than with the Upper one. Similarities have been evidenced between the Kenya Capsian and the Shamarkian industry of the Nile valley. Some resemblances in the bone industry, the grinding material, the use of ochre, have been noticed between the Kenya Capsian and the Capsian of North Africa. In spite of these analogies noted mainly from the stone tool typology, and the similarities of the cumulative graphs (the significance of which is questioned), it does not seem possible in the present state of research to decide if the similarities noticed could be due to cultural diffusion, or rather to a convergent development due to a somewhat similar economy.

Francoise Hivernel

Construction Techniques in Roman brick-faced concrete

Architectural history was transformed in the Roman period by the introduction and development of brick-faced concrete as a building material. The preparation of the individual constituents of the material and the actual erection of the buildings required a large but unspecialised labour-force, and the materials themselves were cheap and easy to acquire. Lime mortar and aggregate could be produced and stored in bulk, and the Imperial brickyards produced roof-tiles and square bricks which could be adapted for facing purposes.

Foundations and walls were built with or without the aid of wooden falsework, and once it was fully cured, the concrete could last indefinitely. The brick-facing had protective and supportive functions during the construction phases, though it was usually covered over by a further decorative facing in the completed structure.

Josephine Holmes

Metalworking in North Wales during the Roman period

A diverse range of metallurgical evidence from a number of sites in the area approximately under the command of the Roman legionary fortress at Chester is collected together and analysed from social and economic standpoints. The aim of the work was to formulate a method of research and draw up a system of analysis to treat metallurgical evidence so that it might reveal some of the relationships between the miner, the smelter and the smith during the Roman period. The evidence gathered is considered against the broader geological, historical and economic background of the area at that time. The tentative conclusions drawn suggest that it may be profitable to use the method of analysis demonstrated with a view to considering the metallurgical evidence from the province of Roman Britain as a whole. The complexity of the social and economic life of Roman North Wales is borne out by the metallurgical evidence presented, but it is to be stressed that firm conclusions can only be drawn when much more evidence is available in the form of ore, slag and metal artifact trace element analysis. The adoption of more flexible hypothesis in other branches of Roman archaeology, particularly with regard to social and economic evidence, is also imperative in the understanding of the metallurgy of the period.

R. S. Kelly

A Comparative Study of Pongid Mandibles to clarify the Phylogenetic relationships of Plio-Pleistocene Hominidae.

The work attempts to distinguish different Hominid forms, using surviving and relatively complete mandibles, and to associate new discoveries with known taxa. To achieve this, a number of measurements of human and pongid jaws were taken and compared as a series of graphs. The pongid jaws of known species and sex show the specific variation and sexual dimorphism that might be expected in an Australopithecine form. Different pongid species have different habitats, activities and diets, and the mandibular morphology presumably reflects these. The changing environment and diet of man has led to a gradual reduction in the need for prolonged mastication and a subsequent reduction in the molar teeth. It is shown that the jaw of *H. sapiens* is designed to meet the needs of a diet between those of *Pan* and *Pongo*, though his original dentition, as exhibited by the Australopithecines, was for the extreme use of molars. New finds from E. Rudolf have been assigned

to the genera *Zinjanthropus* and *Homo*, while the taxonomic status of some old discoveries has been strengthened. *Homo*, dependent on an omnivorous diet, and *Australopithecus*, dependent on a vegetarian diet, appear to be concurrent lineages, witnessed at Olduvai and E. Rudolf, and evolving from a common ancestor.

A. J. Lawson

An Examination of the Occurrence of the Sphinx and the Griffin in Canaanite Iconography

The aim of this study is to investigate the development of the composite animals – the griffin and the sphinx within Canaanite iconography. It also attempts to examine the fusion, transformation and diffusion of the idea of composite symbols in the Near East. The continuous appearance of these particular symbols throughout all forms of Canaanite art provides a solid framework upon which to base such an analysis. Although the griffin and the sphinx had originated in other countries, the Canaanites readily adopted them, changing their forms to suit their own artistic needs, virtually creating new creatures. These new forms were then rediffused throughout the Orient and the Aegean; it was the Canaanite treatment that was to survive rather than the original form of these symbols.

A catalogue of their occurrence in Canaanite art is provided with the text. It is hoped that it will prove to be a useful compendium of the material.

Margaret A. Leveque

Aspects of sacrificial rites in some Early Roman festivals

The Report comprises an account of Roman sacrifices. Part of it deals with the topic in general terms, and part in more detail. The general account covers both public and private rituals, the material being drawn mainly directly from classical authors. A description of how a typical Roman sacrifice was actually performed follows this general account. More detailed sections follow. These deal with the sacrifices in the Agonia festivals, in the more controversial Lupercalia, and in the Terminalia. A special section is included which relates the role which cakes and pastries play in certain Roman rituals. The Robigalia is considered in the concluding section. In this final part, current anthropological theories suggesting that sacrifice originated in deicide, are discussed in relation to Roman evidence.

A chart showing the frequency of particular victims in sacrifices mentioned by Livy and those in the calendar festivals is included. Another chart tabulates the various information we have about sacrifices in the Roman calendar festivals. There are some photographs appended, which show some reliefs of sacrificial scenes and of sacrificial altars, and of sacrificial attendants.

Claudia J. Lowe

A Reassessment of the Early Bronze Age material excavated at Tell Hesi 1890-1892

The main objective of this paper is to make available all the EB material that could be traced from the excavations at Tell Hesi by Petrie and Bliss between 1890 and 1892. Once the material had been traced, it was redrawn according to modern conventions and classified.

Parallels from the best stratified EB sites have been made where possible for each object. The picture which emerges from these parallels is that the whole of EB Hesi came within EB III. Occupation at EB Hesi probably began in early EB III, linking with the end of Gat I, and ended during the period contemporary with Tell Beit Mirsim stratum J. It is not clear whether there was any gap during this EB occupation.

All the recognizable foreign influences are from the North with practically nothing from Egypt. This together with the other information we have about Hesi (defences, trade etc) fits the period of the decline of the Old Kingdom and is reflected in Uni's account of his campaign against the Asiatics.

EB Hesi has some unique groups of material which need special attention. An important group of potters' marks is discussed in the light of a corpus of third millennium potters' marks presented on plates XII-XIX. The wide variety of combed wares are analysed from the aspect of technology and are shown within the context of trade along the Levant. The cultic significance of the snake and dove motifs is discussed. The metal hoard is not dealt with in this paper, but the findings will doubtless play a part in the discussion as to dating.

John Matthers

A Comparative Study of the Neolithic material from Soufli Magoula, Thessaly

The aim of the report "a comparative study of the neolithic material from Soufli Magoula, Thessaly" was to present in a more detailed study the material excavated about 15 years ago in one of the most interesting neolithic settlements in Thessaly.

The material, mainly pottery, has been presented in a chronological order and comparisons have been drawn to other neolithic sequences in Thessaly and elsewhere in Greece.

The restricted excavation brought to light an uninterrupted sequence of the Pre-Pottery and the Early Neolithic periods. The first attempts at making pottery could also be traced in this settlement. The earliest pottery phase was succeeded by the Protosesklo phase with the earliest painted pottery thus confirming Milojčić's periodization at least in the northern part of Thessaly. Carbonized grains found in abundance at Soufli have thrown some light on the economy during the PPN and Early Neolithic phases. The Pre-Sesklo impressed pottery was represented by unstratified Barbotine and Cardium sherds. Several varieties of the Sesklo pottery appeared in thin deposits and especially the scraped A3₂ group was found in abundance in the fortification ditch which seems to have protected the settlement during the Middle Neolithic period. A most important pottery group decorated with painting, incision and scraping is a local feature so far represented exclusively at Soufli.

The material revealed so far, provides only a hint of what the settlement might yield in the future. Outside the settlement itself, the cemetery with cremation burials of the Larissa phase opened a new chapter in the study of burial practices and threw new light on the character of the Larissa phase.

Last, but not least, the discovery of the menhir bearing in low relief the figure of a Mother-Goddess, which is unique in Greece, as well as the existence of Bronze Age deposits and Mycenaean graves have made Soufli recognized as one of the most important prehistoric settlements in Thessaly.

Euphrosyne Risopoulou

Iron Age Stratification at Megiddo

Megiddo is one of the key sites for the Iron II period in Palestine. During the past century its Iron Age strata have been the subject of several excavations and numerous studies. Despite this fact, a controversy still rages over the stratigraphic attributions of certain structures and the dating of the individual Iron Age strata.

Each major area of the tell is analysed in a separate section. The sections contain a phasing of the structures in that area followed by a stratigraphic analysis of the relevant strata. Pottery associated with the different structures is discussed with the view to establishing a chronological sequence. In a concluding section the phasing of the tell as a whole is discussed as well as the dating of the individual phases. Historical implications which can be derived from this paper are also examined.

The dating of the Megiddo strata will remain somewhat uncertain until a more accurate picture of the Iron Age ceramic repertoire of Palestine is obtained.

Enid Saltzman

Aspects of the South Aegean Neolithic

Recent excavations in the area of the South Aegean (the Peloponnesus, Crete, the Cyclades, and Keos) with deposits of the Neolithic period have contributed new evidence of the equipment and life-styles of local populations. In this Report, the findings of these recent excavations, as well as some of the older excavations, in the area which provide evidence of the nature, development, and origins of subsistence economies, and the character and development of settlement patterns are considered. Variation in subsistence economies is noted, and it is concluded that present evidence suggests that the techniques of agriculture and animal husbandry were imported into the area. While the crop plants were probably also imported, there is some evidence from Lerna in the Peloponnesus which suggests possible local domestication of cattle and pigs. The character of the sites varies a good deal, and the fact that so few have been excavated, and that those which have been are fairly distant from each other, and are not contemporary, makes comparison of them difficult. The evidence of settlement in Crete, however, indicates a single tradition, as do the sites of the Saliagos Culture in the Cyclades. Burials, while showing some variation between the three main areas, and even within a single site (Kephala), do show some similarities. The simple nature of most graves, and their scarcity, however, makes it difficult to deduce cultural contacts from the evidence. The evidence that settlement patterns can provide of possible ancient patterns of land use, is very briefly considered.

Laura H. Schaaß

North Africa beyond the Roman Imperial frontiers

This dissertation first discusses the position of the Roman frontier in Africa, from the Atlantic to the Nile. A distinction is made between the frontier proper (*fines*) and the military works which defended it (*limes*). In Europe the two generally coincide: in many parts of Africa, however, the frontier ran through uninhabited forest or desert, while the defence-works (whose object was to protect the sedentary peoples from attack by the nomadic ones) lay at a considerable distance behind it. The history of the various *Limites* is discussed, and a possible course suggested for the *fines*.

Secondly, exploration beyond the frontier is considered. The great sea-explorations described in ancient sources are mostly pre-Roman; but remains found on Mogador Island show that Roman ships, too, sailed the Atlantic – though probably not reaching beyond southern Morocco. By land, more

extensive expeditions were made, mostly by the army: the campaigns of Suetonius Paulinus in the Maghrib, Cornelius Balbus in the Fezzan and Julius Maternus in *Agisymba* are discussed.

Finally, some ancient accounts of the inland parts of Africa – from Herodotus to Ptolemy – are examined, and an attempt made to interpret them. The difficulty in doing this lies in the fact that, in ancient geographical writings, real accounts by genuine explorer are inextricably entangled with mythical material from the time when Africa, to the Greeks, was a closed and unknown land.

N. H. H. Sitwell

Sylloge Nummorum Etruscorum

This Report includes and is based on a sylloge of the British Museum's entire collection of Etruscan struck coinage. The only previous sylloge of this collection is included in the *British Museum Catalogue of Greek Coins*; this however was published in 1873. Since that time the British Museum's collection has expanded significantly, and therefore this fully illustrated sylloge is the only complete catalogue of the British Museum's present collection.

In addition to the sylloge there is also an outline of Etruscan coinage, examining the many problems encountered in the study of this always insufficiently documented series of coins. Among those problems discussed are; dating, weight standards, marks of value and mints.

There are also two theories upon which comment is made. The first is a matter of identification based on an article of clothing. This coin has been the matter of a lively discussion, and the view taken in this paper is diametrically opposed to that of the American Numismatic Society. The other theory has to do with what may very well be a commemorate issue. This coin may be of great historical importance as it may give us new ideas of the Etruscans' relations with the Carthaginians.

This Report then is a discussion and outline of Etruscan coins based solely on the sylloge of the B.M.'s collection.

D. E. Tripp

Summaries of Undergraduate Reports

1973/74

The Native settlements of North-West Wales in the Iron Age, Roman and post-Roman periods

This essay is an outline of the study of these sites – their description, classification by various methods, and interpretations of their history and functions. The sites treated are the hillforts and round stone huts, some in groups, and some associated with field systems, in North-West Wales. They are described, and problems of their dating, classification, origins and history are discussed. Their social and economic significance is also treated, using later literary, as well as archaeological, sources.

It is probable that a more representative sample of sites can be gained from this area, because of the widespread availability and use of stone for building, and in spite of possible non-preservation of timber features, one could say that nearly all the sites represent basic economic entities, rarely acting as much more than refuges, if with any defensive purpose. Agriculture and stockbreeding were practised as all times, with emphases on different aspects in different periods, but it is unlikely that there was a truly nomadic pastoral society in the area, contrary to older theories.

The conclusions drawn can only be tentative, but a great deal has been derived from field survey, literary sources, and study of what excavated material there is.

Sioned Alban-Jones

The jug in Roman Britain

Various aspects of the jug in Roman Britain are dealt with. The history of the jug in pre-Roman and Roman Britain is outlined briefly in Section I. The almost total absence of the vessel in the late Iron Age material culture contrasts strongly with the large numbers of jugs of the Roman period. An outline of the production of jugs in Britain is given, and various uses for the vessels suggested. Section II is devoted to some social and economic aspects of the jug. The evidence is assessed for the import of liquids, particularly wine, for which jugs would have been required as containers. Pre-conquest burials and a number of Romano-British graves and cemeteries are examined to determine the use of the jug in burial customs. The Roman army in Britain is seen to be a leading consumer of jugs, and various sources of supply are discussed. A tentative typology is offered in Section III for the development of the jug throughout the Roman period. This will unfortunately be of only limited value to the archaeologist for dating purposes since it is by no means exhaustive.

Belinda M. Barratt

The Cistercian Grange System, 1132-1540 – An Archaeological Approach

In this paper I present a case for the archaeological investigation of Cistercian granges, basing it on an examination of the granges (agricultural estates) of Fountains' Abbey in Yorkshire.

Contributions to the study of the grange system have been made by both historians and economic geographers, but the evidence of Archaeology was ignored until C. P. S. Platt published "The Monastic Grange in Mediaeval England: A Reassessment" in 1969. Platt suggests that archaeological investigation of granges, many of which have substantial earthworks, may resolve problems of the Buildings and the Staffing of granges about which historical records tell us very little.

My paper includes summaries of the Historical and Economic Background to grange development – sections from which I draw many questions about Staffing and Buildings which can only be answered by excavation. In the second part of the paper are listed the sites and visible remains of Fountain's granges (with the suggestion that there is a variation in groundplan of the granges between highland and lowland). I discuss some of the opinions held about the Buildings and Staffing of granges, with particular emphasis on Platt's views about the nature of early grange buildings and their later elaboration or destruction. Finally, there is a brief account of the excavations at Cowton grange.

Because of the nature of the archaeological evidence – Cowton is the only excavated site – questions are only posed in this paper not answered. Only by further excavation can answers be obtained.

Patricia A. Conroy

Economy and Location of Bronze Age "Arable" settlements on Dartmoor

The Bronze Age 'arable' settlements of Eastern Dartmoor are studied in relation to their local resources. The study is made in accordance with Chisholm's contention that local resources – building materials, water supply etc. – will exert 'pulls' on the siting of any settlement.

One problem has been to relate the sites to the environment of the Bronze Age. To do this reference has been made to Simmons's pollen work from the Dartmoor bogs.

An attempt has been made to relate results to the principles of Von Thünen and the hypothesis is put forward that the agricultural régime of these sites paralleled that of the Scottish 'Infield-Outfield' system.

Using Thiessen Analysis, the site catchment area of one site (Blissmoor) is constructed.

In order to use Thiessen Analysis, the distribution of settlements has to be shown to be contemporary. This is attempted by archaeological methods.

G. T. Denford.

Roman Limeburning

Lime was an important material in Roman times, being widely used for building and agricultural requirements, and its production would have been comparatively skilled work.

On calcination in the neighbourhood of 900°C limestone in its various forms decomposes into carbon dioxide gas and calcium oxide or quicklime. The Romans used a periodic or flare kiln to produce an evenly burnt and clean lime which, as it retained the impurities of its parent material, might be capable of setting under water.

Lime was chiefly used in construction work where its binding properties were apparently first recognised in the third century B.C., perhaps as a result of Greek knowledge. Quicklime combines with water with the evolution of heat to form slaked lime which, when mixed with either sand or pozzolana, was used for a variety of plaster, mortar and concrete mixtures.

Unslaked lime was doubtless extensively used in agriculture to promote land fertility and would generally have been produced in flimsy clamps or kiln pits. The lime product, either slaked or not, was also used in other processes, most notably in tanning and in the preparation of medicinal ointments, where a pure type would obviously have been essential.

B. J. Dix

St. Catherine's Hill. A Mesolithic site near Guildford, Surrey

Almost 3,400 pieces of struck flint, including 99 implements were recovered from the above site (by collection, not excavation) and are now in the possession of the British Museum. The assemblage was sealed at a depth of six inches, and the percentage of by-products indicates that it is complete.

A comparative study of this material and that from Farnham Pitt II suggests that St. Catherine's Hill, although representing a limited range of known Mesolithic implement forms, is closely related to the Farnham group, despite the dissimilarities between the two assemblages in general composition. The evidence for this assumption lies chiefly in the main microlith implement, the obliquely blunted point. Studies showed that its variants are present in closely similar proportions in each assemblage. Analysis of certain technological features, such as the incidence of various types of retouch, gave confirmatory results. Some specialized activity within the main group might be hypothesized, and similar associations of the limited range of implements are known from other Lower Greensand Mesolithic sites, several of which have a similar topographical setting to St. Catherine's Hill.

The patination of St. Catherine's Hill and other Mesolithic assemblages which has been an occasional, somewhat puzzling feature of Lower Greensand sites, seems on present evidence to be due to an apparent coincidence of such sites with Bargate Beds outcrops. These, unlike the rest of the Lower Greensand deposits, according to analysis of the material and observed fossil content, are highly calcareous.

Gillian E. Gabel

Analysis of Animal Bones from Bishopstone and Newhaven in relation to the economy of the Iron Age and Roman period in Sussex.

A study was made of the faunal material from two sites in Sussex.

Bishopstone is a native farming settlement from the Late Bronze Age to the Saxon period. During the Iron Age sheep were slightly predominant over cattle, also present were horse, pig, dog, deer and bird.

Newhaven is a Romano-British site, one and a half miles away, possibly a villa settlement. This showed slightly more cattle than sheep; also present were horse, pig, dog, deer and bird.

The results from these sites were compared with others, where a recent detailed study of the faunal material had been made. On such sites cattle were strongly predominant, indicating a local

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difference at the above two sites. However, none of the sites used for comparison were in the immediate vicinity since the faunal material had been insufficiently recorded to allow this.

The accuracy of methods used for measurement, age assessment etc are discussed and also the limitations imposed by a lack of standardisation on faunal work.

Alison Gebbels

"Aims in Prehistory" (Trigger 1970) – a critique of the historiographical concepts

In a contribution to the contemporary 'history' versus 'anthropology' debate in prehistory, the latent origins of which are shown to date from the beginning of the century, Trigger (1970) defends the historiographical orientation. He attacks, as an outmoded concept which is widespread among prehistorians, the notion that a historiographical orientation implies 'purely descriptive' goals. He describes modern historiography as an ideographic discipline, closely related to, but autonomous from, nomothetic social science. It is on this basis that he forms his arguments for a historiographically oriented prehistory. Two main problems arise. First, 'ideographic' historiography as he defines it is logically part of social science, and not an autonomous discipline. Second, 'ideographic' historiography, as understood by historians, appears to be the traditional 'purely descriptive' historiography. Thus, though correctly noting some contemporary developments in historiography, Trigger fails to present them in a rigorous manner – which is necessary if arguments for a historiographically oriented prehistory are to be developed.

Stephen N. Gourlay

Southwark: Aspects of Settlement in the Roman Period – Summary

Considering the post-Pleistocene swamping of the Thames Valley generally, a more detailed outline of this process in the London area can be obtained by a study of the dating and sequence of many of the alluvial deposits examined during excavations in Southwark. The general conclusion can be drawn that following a period of comparatively high river level in the later Iron Age, there was a lower level in the early Roman period, but that later, problems of higher river level were again encountered, and whether or not this affected Roman settlements in the Thames Valley, is discussed. The general pattern of the Southwark settlement is based on the road system into London, and does not extend very far South from the river crossing, and chronologically it quite closely corresponds to the sequence of development in London. It begins as early as London, and the main change in the character of the settlement takes place about the middle or end of the Second Century A.D., with the beginning of quite substantial stone structures, with a more scattered distribution, which replace the less substantial and more cluttered timber buildings of the earlier period. This change from a thriving artisan area, to a more wealthy, residential area, is closely paralleled in the Walbrook Valley in London. Occupation in the area, associated with these stone structures, can be seen to continue at least until the end of the Fourth Century A.D.

Alan H. Graham

The Significance of Soil Fauna, with special reference to the mites in Archaeological Deposits

The aim of this report was to show that microarthropods of the soil mesofauna (ranging from 100 μ to 1 cm in size), could be extracted from archaeological deposits and used as environmental indicators. After considering the characteristics of the various faunal groups, it was decided that the Acari (mites) were the most suitable for this purpose. The environmental preferences of species within the most common Acarine Order – the Cryptostigmata, were then discussed in detail, using work on modern soils, so that an interpretation could be made from the Acarine fauna extracted from an archaeological sample. Several extraction techniques were studied, and it was decided that a combination of wet sieving and flotation would be the most effective. Samples from the old land surface and turf stack of West Heath Common Barrow I and Silbury Hill were analysed, allowing an interpretation to be made of the Silbury Hill fauna. The West Heath sample was inadequate. The faunal evidence suggested that the original vegetation had been an established grassland with isolated trees. This agreed with evidence from other sources.

Susan M. Harrison

The Roman Occupation of the Mersey, Ribble and Lune Valleys

The region bounded by these valleys includes all of Lancashire south of the sands, and parts of Westmorland, Yorkshire, Cheshire and Derbyshire. Such a region thus avoids the difficulties of dealing with county boundaries, which are political rather than geographical units. However, when sites outside the region are related to sites within they have been dealt with.

The first part of this Report is an attempt to tie in the sites to the history of Roman Britain. The latter part deals with various aspects of the region, the garrisons of the forts, civilian settlement, industry, communications and religion.

B. J. Hodkinson

A preliminary survey of the Nok Culture (of Central Nigeria) with emphasis on the figurines

The Nok Culture is named after the Jaba Village of Nok where the figurines were first found. This Culture was first defined by the Nok assemblage found in Alluvial deposits in the Nok Valley. Caution was therefore expressed in regarding these associations as constituting a single culture. However, further investigations of primary sites have now confirmed these associations and the antiquity of the Nok figurines. Radio Carbon dates from some of the sites have confirmed the chronological position of the Nok Culture, and the Culture is now seen as an Iron Age Phenomenon which must have lasted from about 500 B.C. to 200 A.D.

The figurines are the main distinctive elements of this Culture. Most examples of the figurines are human figures, though there are also animal representations. In all, human figures and heads are the best known and artistically the most prominent creations of the Nok Culture. They tend to show a variation in style and treatment which is said to be in an African mode. It is possible that technically they may have been influenced by wood-carving because most of them are in many ways reminiscent of wood-carvings.

It is not known from where the Nok art took roots and it is not clear either whom its descendants were. So far the Old Ife Culture is the closest possible descendants, as yet known. Many similarities between these two art forms exist, though chronologically these two are centuries apart. Similarities with the Nok art also exist in some art forms and customs of some tribal groups in Nigeria today. These similarities could be a thread of continuity of the Nok art.

J. F. Jemkur

Roman Astrology

The first part contains an outline of the history of astrology in the Roman world with special reference to the period extending from the late Republic until the death of Severus Alexander, the last enthusiastic imperial patron of astrology. At first an interest in astrology was limited to the less educated people in Roman society, but the beginning of the period witnessed the gradual growth of interest by Roman intellectuals in scientific or fatalistic astrology. The early principate was remarkable for the considerable influence of court astrologers on the emperors and thus on Roman politics, together with the legal restrictions taken against astrologers in the form of temporary expulsions from Italy and Rome and the enforcement of an empire-wide ban on the consultation of astrologers and other diviners on certain topics. The latter part of this period saw an increasing predilection for astral cults and the decline of interest in scientific astrology by the Romans although astrology as such still seems to have remained fairly powerful.

The second part attempts a documentation of gemstones relating to astrology. In general these gemstones are limited to representations of the signs of the zodiac, either individually or combined, astral symbols and constellations; they do not attempt to show any of the more complicated techniques of astrology.

Patricia B. Jones

Some aspects of the Neolithic Chambered Tomb sites in Caernarvonshire in the light of Antiquarian references

A collection of hitherto unpublished antiquarian manuscripts and references of the last three centuries that related to Caernarvonshire were looked at with the aim of extending present knowledge of megalithic chambered tomb sites in north west Wales. Twelve new sites were identified and located from the references, bringing the total of known sites in the county to thirty. Very little if any visible remains are left of these twelve sites today. The distribution pattern of the thirty sites suggests a concentration of tombs in five distinct groups, all of which are situated on the higher slopes and outcrops of the lowland zone of Caernarvonshire (0-600 feet above sea level). The five groups are: the western part of the Lleyrn peninsula; the coastal plain to the north of Pwllheli; Criccieth and Tremadoc; the Clynog area on the northern slopes of the Rivals mountains; the coastal plain to the south and south west of Caernarvon, between the valleys of the Gwyrfa and Seiont rivers; and lastly the basin of the Conway river. All five areas have good and safe access to the sea. As the majority of the thirty tombs are ruined so as to be unintelligible in any typological sense, it is impossible to see whether any one of the five groups has individual characteristics of tomb morphology.

Richard S. Kelly

The Iron Age of Kent

The report on the Iron Age of Kent is concerned firstly, with the archaeological sites and secondly, with the artifacts. Excavations of the hillforts, early and late settlement sites ranging from ditched areas to village communities, burial sites including early inhumations and some later Iron Age cemeteries and smaller sites or findspots have produced varied material, frequently inadequately

recorded and published. The background of the sites themselves, their features and interrelations between sites, provides a basis for studying the metalwork, coinage and pottery. Different functions in the metalwork can be seen by the variety of tools produced as well as artistic skill on their design and decoration. The coinage in particular shows links with other regions and gives some information about tribal kings, being initially introduced from Gaul, it enables distinct waves of immigrants to be located. Finally the most prolific find, the pottery, has been grouped into types, of criteria of shape and decoration which show relations between sites and/or centres of distribution and trade. The typology consists of narrowly defined types which may be extended to incorporate new finds. Hence this synthesis of Kentish sites and artifacts serves to describe and relate the known material.

Susan Morris

Late Roman Shell-Gritted Ware in Southern Britain

Late Roman Shell-Gritted Ware, the latest of a long tradition of shell-gritted ware in the Midlands during the Roman period, was widespread over central southern England, East Anglia and parts of Wales in the late fourth century. Its characteristic forms, a cooking-pot with an undercut rim and a flanged bowl, appeared by the middle of the fourth century. Only one definite kiln site is known, Harrold in N. Beds., but this probably did not produce a large percentage of the ware, and there must have been others, perhaps in the Northants. area where shell-gritted pottery was certainly produced in the 3rd century. The Ware continued popular into the first few decades of the fifth century but there is no evidence that it outlived the other pottery industries of Roman Britain.

Janet Sanders

The Iron Age of the Bedford region

Within the county of Bedfordshire, the Great Ouse valley, in which the modern town of Bedford lies, though not renowned as an area rich in Iron Age occupation, has produced a not inconsiderable quantity of evidence from sites and chance finds. However, the material is mostly unstratified and unassociated, and predominately ceramic. It suggests the possibility of an early phase, comparable with the early Chilterns to the south, but the evidence for this is very poor. There is no trace of the fine, angular pottery phase of the Chilterns. The greatest part of the material from the Bedford region accords with the globular tradition, with its associated forms, which is seen at Hunsbury and other sites in Northamptonshire, and in the later pre-Belgic phases of the Chilterns. Only one settlement site can definitely be assigned to this period. There is no absolute dating evidence for the pre-Belgic Iron Age. The Belgic period is represented by typical late Belgic pottery forms, some of which show local variations, metalwork, and two excavated settlement sites. Dating is again uncertain; none of the available and published material points conclusively to a date earlier than the first century A.D. No Roman Conquest horizon is apparent.

Angela H. Simco

Roman Saddle Horse Equipment: Its Use and Application

The fruits of a study of Roman horse equipment undoubtedly remain to be plucked. A detailed typology and chronology might be constructed from some of the more detailed and prolific material, and specialized forms could be used to trace the movements of cavalry units within the Empire. Within the scope of this essay, however, I hope to have planted the seeds. This is a systematic compilation and examination of the material. Some has been considered before, and the result has been confusion or misinterpretation owing to the ignorance of the authors on the subject of horsemanship. I found that in many cases the possibilities were numerous and many 'doors' for interpretation had to be left open. The satisfaction of a logically argued conclusion is not always granted, but dispelling confusion, doubt and error is just as valid. The picture which emerges from this examination is of a people with a high degree of ability in horsemanship, although some subtlety of method is lacking.

Annabel K. Taylor

A Late La Tène burial from Castiglione delle Stiviere (Northern Italy)

The author describes a grave found in 1914 in a gravel quarry near Castiglione delle Stiviere (Mantua-Lombardy).

This grave, dated to the Late La Tène period, is compared to similar finds in the regions to the north and mainly to the south of the Alps.

The comparison between the grave from Castiglione delle Stiviere and the other Northern Italian ones could create an interesting sequence for the pre-Roman and early Roman period in the Po valley and in the Alpine region. The study of such a period could be interesting for the knowledge of the Gaulish culture of which plenty is yet to be known in Northern Italy.

The author dates this grave around the year 100 B.C. and attempts a chronology for the main Late La Tène burials in Northern Italy.

M. Tizzoni

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Late Holocene Forest History in eastern Anatolia as indicated by charcoal from four archaeological sites

The four sites concerned are situated in the Upper Euphrates Basin near the confluence of the Euphrates with the Murat where historical circumstances have caused deforestation through over-grazing, exploitation of timber for fuel and agriculture. Only small isolated relicts of the former vegetation exist, from which one can infer the theoretical climatic climax. It is known that this situation was reached by the end of the nineteenth century, and that since then there has been an acute shortage of wood.

A large number of charcoal samples recovered by water separation and trench sampling were identified, the majority to generic level. The results indicate that no major climatic change has taken place over the last 4,500-5,000 years, and that until the Classical period woods one might expect to find in the inferred climatic climax were exploited, oak being the most frequent. During and after the Classical period timber, probably poplar, appears to have been cultivated and spiny shrubs were coming into use as an alternative source of fuel. By the late Medieval period a further shortage is indicated by the apparent importation of pine and a dearth of oak. Thus we can infer that deforestation had begun by the Classical period and continued until almost complete obliteration resulting from over exploitation by nearby mines at the end of the nineteenth century.

G. H. Willcox

Book Reviews

REDMAN, Charles L., (ed) *Research and Theory in Current Archaeology* New York & London, John Wiley and Sons: 1973. x + 390pp, line drawings and diagrams. Paperback £3.90

This collection of twenty-three essays was expanded from a set of nine contributions to the 1971 meetings of the American Anthropological Association, 'Archaeology's future: Roles and Relevance'. The main body of papers is divided into four sections: Approaches to Contemporary Archaeology, the Goals and Scope of Archaeology, Methodological Frontiers and Restructuring the Organisation of Archaeology. Such interchangeability of titles is a common experience for devotees of Binclarke. Editorial summaries at the start of each section and a concluding trio of chapters entitled 'Commentaries' mark a step closer to the corporate academic state, where writers dispense with reviewers altogether, a position admittedly more productive than its converse.

The moderate aim of this volume is to 'elicit new papers on current developments and future trends within archaeology', presenting 'archaeology as an active area of intellectual enquiry with all its important theoretical and methodological innovations'. There is something for everyone in this volume, from spatial studies of soup-cans to covering-law theory, and structural weaknesses are inevitable in the presentation of such varied material. But these limitations are not too severe, for they contribute to a sense of continuing debate, achieved by the juxtaposition of opposite points of view. We have found a threefold division of subjects most helpful for their review, rather than the editor's original four sections. The areas of interest discernable are: 1) the theoretical tenets of processual archaeology (eleven papers), 2) specific examples of the deductive approach (three papers) and 3) optimizing strategies for archaeological resources (six papers). A final section looks at problems of integration of method and theory in archaeology: a concern central in some of the essays and of interest to many of the other contributors.

Section 1: Theoretical tenets of processual archaeology

A major part of the debate centres on whether aims and strategies should be historical, intuitive and idiographic or scientific, explicit and nomothetic. Polemicists still exist on each side, of course, the most extreme case here being Ford, who argues that archaeology has potential to solve current problems. On the other hand several former iconoclasts are moderating their shrieks, notably Watson who reviews both viewpoints concluding that 'there is no logical conflict between the two', and so calls for more restrained yet constructive debate. Her paper also takes up but fails to meet Allen and Richardson's challenge to recent applications of classical kinship theory (1971). Progress in the debate is analysed in a penetrating paper by Flannery, who lists some 'none-too-favourable trends' in the brief life of New Archaeology. Plog argues persuasively that archaeologists are much better equipped to measure changes in behaviour (through the artefacts recovered) than social anthropologists whose data will only cover the recent past. He also discusses how archaeologists reconstruct *sequences* of events from the *spatial* patterns which constitute the archaeological record, and the problem of conventional chronological presentations which inevitably suppress the dynamic nature of change. Leblanc ingeniously demonstrates that data used in formulating hypotheses can also be used in testing them (with the obvious exception of statistical inferences), but he finally confesses that initial data is seldom sufficient to confirm the hypothesis. His other major point, that general laws are built on pyramids of laws of decreasing triviality prompts the question whether any non-trivial law-like generalisation has yet been confirmed by the covering-law method. Returning to a favourite subject, Trigger examines the relationship between archaeology and the historical and social sciences and in so doing castigates the processualists who hold an erroneous view of history, which he indicates is not 'mere chronicle'.

Section 2: Specific examples of the deductive approach

Three chapters are devoted to the results of specific projects—Salwen on A.D. twentieth century location models in New York, Leone on Mormon town-planning and Williams, Hurst Thomas and Bettinger on the Reese River Project. Salwen explores the social conclusions inferred from modern above-ground artefact distributions. This is an interesting approach and we can doubtless look forward to further elucidations of pizzas, patios and preachers. The second is Leone's concern for archaeology

as a form of history of technology and looks idiographically at a utopian attempt at equality of land-usage in the Little Colorado valley. Indeed one can use the data presented by Leone in a Salwen-type analysis. The Reese River project exemplifies the 'inductive-deductive interplay' inherent in a skilfully constructed research programme. The method seemed to save survey time/effort but there is a lingering suspicion that the teams found only what they were looking for.

Section 3: Optimizing strategies for archaeological resources

The 'methods revolution' has necessitated a realignment of archaeological organisation as profound as the impact of any new theory. Few have taken this seriously but an exception is the Illinois Valley project where Brown and Struever have set up (at undefined expense) a multidisciplinary team with laboratories and a computer terminal at a base near the excavation areas. Woodbury, Taylor and Braidwood concentrate on administrative questions. Woodbury questions the role of the PhD in the training of archaeologists. Whereas the PhD may have been the correct qualification for University posts which once offered the major career outlet for archaeologists, it does not have the same applicability to field archaeology where the majority of new posts are being created. Taylor looks at the co-ordination of specialists in a clearing-house scheme and at archaeological public relations. He rightly considers better communication of archaeology's wider and more explicitly stated aims vital in maintaining continued public interest and support and the flow of research funds into archaeology. Braidwood gives a thoughtful and witty albeit accurately pessimistic summary of archaeology in Southwest Asia. One of the most stimulating papers comes from Hole, who proposes laboratory training in sensory data perception as a preliminary to excavation: 'perceptive digging is basically a sensual experience that integrates visual, auditory, tactile, olfactory and even gustatory information'. He feels that those who cannot integrate information while digging 'ought to be kept out of the trenches'. Here is a new line in interdisciplinary fieldwork that needs to be followed up.

Section 4: Integration of method and theory

Various contributors discuss the relationship between the archaeological site and the ways we excavate and interpret it. Redman himself notes the deliberate way in which artefacts are made and distributed though the site, and describes post-excavation techniques used to uncover the 'patterned behaviour of prehistoric peoples' which these reflect. Brown and Struever discuss 'activity areas' – e.g. hearths, working floors – as problems at the excavation and recording stage. They state that we must select from various recovery 'collecting scales' and 'we have come to the point where making one observation destroys data for another observation'. This is heretical to British archaeologists of the Pitt-Rivers tradition who are taught to record *all* for future scholars, even what we cannot ourselves interpret. Schiffer and Rathje also concern themselves with the efficient exploitation of the archaeological record. They show that the deposits excavated on an archaeological site come about firstly by the action of the environment on deposits already *in situ* (e.g. processes of decay and erosion) which they term *n*-transforms (non-cultural transforms). Secondly the deposits represent the 'spatial, quantitative and associational attributes which are the function of the depositional behaviour of the cultural system that produced them' (*c*-transforms). These transforms are often implicitly and inadequately understood and misused in archaeological explanation. Thus experiments to study the nature of these transforms and their implications should become standard on excavations, and archaeologically oriented ethnographic work must be continued. In this way explicit links between material remains and behaviour can be forged and data retrieval on site can be more rationally organized. The papers by Leone and Salwen are relevant in this context, as is our own Overton Down Earthwork (Jewell and Dimbleby, 1966).

Gumerman outlines the development and organization of SARG (Southwestern Anthropological Research Group) which has many parallels with our Rescue Archaeological Groups. His main emphases are 1) the need to standardize methodology and data recording in order to allow intersite comparability, and 2) the need to formulate practicable research programmes. Certainly one advantage of larger units of operation is that interdisciplinary work can be entertained at all stages. Brown and Struever's Illinois Valley project is paralleled in this aspect by a small number of similar ventures, (see for example Higgs, 1972, French, 1973) all of which suggest that Taylor's idea of centralized supporting scientists is (hopefully) on the way out. However, the essays on the subject of integration of theory and method *on site* really only serve to show how far we have to go, and that this question will for a long time be crucial for all excavators and cannot lightly be sidestepped.

Most jargon is old hat—possible exceptions being the emicetic dichotomy and cliometry—whilst the gobbledygook award goes to the description of A.D. 18th century towns as 'later steam age urban industrial complexes' (p.153). Five misprints in 390 pages is fair comment on editorial scrutiny, although the presentation of the impressive bibliography is not always consistent. The frequent rendering of 'ideographic' for 'idiographic' is alarming; *will* linguists *ever* learn?

It would be a mistake to judge the health of processual archaeology by the vigour of this volume,

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since its core was formed a mere three years after 'New Perspectives'. The impression of outdatedness – strongest in Section 1 – merely underlines the pace of theoretical innovation. To take one example, Morgan's (1973) attack on covering-law theory appeared after the presentation, before the publication, of these papers. The impression of optimism for New Archaeology is striking – also a reflection of time passed and now a trifle unreal. But even here occasional dissatisfaction rises to the surface – Adams' complaint about the paucity of goal-oriented explanations in anthropology, Trigger's concern over the problems of defining determinant and non-determinant factors in complex situations. One of the greatest threats to the cause of systems theory in archaeology is Jay Forrester's assertion (quoted by Flannery) that when one is dealing with the trajectory of complex systems, almost all correlations are likely to be coincident symptoms, not cause and effect, since the ultimate causes are remote in time and space.

But such doubts and heterodoxies lead forward. It is a tribute to processual archaeology that it has stimulated so much new thought, whilst at the same time noticeable that it has answered few of its major critics recently. This collection of essays mirrors the New Archaeology in both respects, yet it remains a valuable addition to the general literature of archaeological theory and practice.

DAVID WILLIAMS
J. C. CHAPMAN

REFERENCES

- Allen, W. L., and J. B. Richardson III. 1971. The reconstruction of kinship from archaeological data: the concepts, the methods, and the feasibility. *Am. Antiq.*, 36: 41-53.
French, D. H., et al. 1973. *Asvan 1968-72, an interim report. Anatolian Stud.*, (Special Number) 23: 69-308.
Higgs, E. S. ed: 1972. *Papers in Economic Prehistory*. Cambridge: Cambridge University Press.
Jewell, P. A., and G. W. Dimbleby, eds. 1966. The experimental earthwork on Overton Down, Wiltshire, England: the first few years. *Proc. prehist. Soc.*, 32: 312-42.
Morgan, C. G. 1973. Archaeology and explanation. *World Archaeology* 4 (3): 259-276.

LEAKEY, L. S. B., *By The Evidence*, Memoirs, 1932-1951, Harcourt Brace Jovanovich, New York and London, 1974, 276 pp., 12 ill., 1 map, £2.95.

"All these things and much else I shall hope to write in the third volume of these memoirs" wrote Louis Seymour Bazett Leakey at the end of his second of three planned volumes of memoirs. Unfortunately, he would write no more for on the following morning (October 1, 1972) he died in London of a heart attack.

Although for several years, due to failing health, he had not been actively pursuing his field research, he was still stimulating research and motivating people to work in the prehistory of East Africa, the prehistory that he himself had written. From the beginning of the century until very recently, he was responsible for chapter after chapter in the ever-expanding saga of the human species. Whether one agrees or disagrees with the often controversial views that he presented, the indisputable fact remains that he was a giant in his field and all future work in East Africa dealing with any archaeological period will certainly rest upon a foundation built during many years of hard work by Louis Leakey.

"By The Evidence", his second volume, takes up where his first volume "White African" leaves off. It deals with the years 1932, when he left England for his third East African archaeological expedition which would be the first to visit Olduvai, until 1951 which leaves Leakey at the second Pan-African Congress of Prehistory in Algiers. The intervening years were certainly the most prolific in light of the discovering and surveying of sites, the excavation of which would be undertaken in the future. These twenty years also were the most varied in terms of the jobs that Leakey would be called upon to perform.

On Christmas Eve 1936, after an unsuccessful marriage to Henrietta Wilfrida Avern, Leakey married Mary Nicol with whom he had been working for several years. They immediately left for Africa where Leakey was planning to write an ethnography of the Kikuyu, the tribe into which at the age of 13 he had been initiated. The ethnography, which eventually consisted of three large volumes, was never published owing to constant disagreements between Leakey and the publishers who insisted on cutting down the size of his mammoth study. While Louis was working on the Kikuyu, Mary was excavating numerous East African sites, adding to the list of sites located or excavated by Louis, which by then was beginning to sound like a gazetteer of East African prehistory with entries like Kanjera,

Kanam, Rusinga Island, Laetolil, Gambles Cave, Olorgesailie, Kariandusi, Hyrax Hill and, of course, Olduvai Gorge. Olduvai which today fills the textbooks and minds of teachers and students of prehistory the world over, was, with the exception of one small excavation by Reck in 1913, an archaeologically untested locality until, in 1931, a survey was begun by Leakey which would last until 1952 without any major excavations being undertaken. "To give a clear picture of the immense task we undertook . . . we explored about 180 miles of exposures, ranging from a depth of about 300 feet to as little as 50 feet, before we undertook any major digging. Had we not worked to a plan, we might have found ourselves devoting several years to the excavation of one of the less important sites while much more significant ones remained unstudied because they had not been located."

Leakey's choice of interesting and informative anecdotes makes the book extremely enjoyable reading. Episodes such as lions wandering in and out of tents, rhinos dining on the crew's cabbages and carrots by moonlight and the shooting of man-eating crocodiles makes one hesitant to envy the life of early field workers in Africa.

Aside from the prehistorian that we recognize Leakey as, he was also a handwriting expert, linguist and detective; all these came out in his descriptions of his wartime activities with the C.I.D. in Kenya. The sections relating to the many years he spent in developing the Coryndon Museum (now the National Museum) in Nairobi help to illustrate the strength within the man. Through the museum, he was able to bring natural history to the layman and through his great personality and drive he was able to motivate others to carry out scientific researches in East Africa.

Once, when referring to Olduvai, Leakey said: "The person undertaking this study must be willing to devote many years, if not his whole life, to the task, and should not aim for quick results in the field, to be followed by a comfortable armchair job at a university". Louis Leakey certainly devoted his whole life to field work in East Africa, and this admirable book which deals with twenty years in the life of this giant is most highly recommended to researcher and layman alike. It is both enjoyable and informative and, sadly, it was the last thing that Louis Leakey would ever write.

IAN S. ZEILER

AHARONI, Y. — ed., *Beer-sheba I. Excavations at Tel Beer-sheba, 1969-1971 Seasons*. Tel Aviv University, Institute of Archaeology, 1973, xvi + 135 pp. 95p.

Beer-sheba I is a collection of brief articles concerning the results of three seasons of excavations at a site near the city of that same name in modern Israel. We are grateful to the whole dig team, and to those who provided the publication funds, for getting this material into print so soon after the field work.

Aharoni, the editor of the book and director of the dig, begins with four general essays concerning the excavation programme, the site stratification, and the Iron Age city. The excavations and area surveys revealed a Chalcolithic stratum (CH) followed by a gap of two millennia (no remains from any of the Bronze Ages), then six strata of Iron Age occupation (Str. VI-I), four strata of Persian-Hellenistic-Roman remains (H₃, H₂, H₁, R), and an uppermost level of Early Arab material (Ar). There was a fortified city in Str. V-II of the Iron Age; the city's lifespan was ca. 950-700 B.C. After that era there were no more cities on the tel, only fortresses. In Chapter 21 Aharoni returns to the Iron Age city, relating it to historical and biblical data, as well as to other sites of the period, making many insightful suggestions about defence systems, cult centres and the place-names of the Shishak list.

Chapters 5-20 deal with specific finds. These chapters have the character of final reports which frequently are relegated to appendices in final publication volumes. Included are the expected studies of architecture, coins, foreign artifacts and epigraphic finds, plus some less common environmental-technological analyses (re floor stabilizers, iron ploughshares, basketry and botany). Tententially, we might mention the fruitful practice of dipping and examining sherds prior to scrubbing; the yield of epigraphic material seems to be well worth the investment of time and energy. Perhaps the practice should be universalized wherever 1st millennium levels are encountered in the Levant.

The last two chapters (22, 23) are given over to a report on soundings in the nearby modern city, and methods-cum-forms used in recording the main excavation. The book concludes with a list of loci, plates of black-and-white field and object photographs, drawings of artifacts, maps and plans.

This is an unpretentious book and is reasonably free from printing/editorial errors. Almost every aid (lists, tables, figures, references, etc.) is clear and useful. Most of the photographs, especially of the artifacts, are good-to-excellent, as are the drawings. On the other hand, given the nature of this book, it seems that there are too many drawings of essentially identical vessels. One also continues to hope for the advent of a standard, objective description of pottery.

Detailed comments on each article would require too much space for this review; nevertheless, certain features need to be applauded. Most of the articles have been done in a concise, precise,

thorough and well-documented manner; exemplars are the back-to-back chapters (14-15) treating the votive cylinder seal with cuneiform inscription. Some of the articles bode well for the expanding horizons of archaeology, particularly Chapters 5 and 20 which are based on environmental sciences, and Chapters 9-11 which present prosaic artifacts (an iron ploughshare and a fragment of a palm frond basket) in a professional way that makes them as 'valuable' as the ostraca, coins, or the like. Because of these professional accomplishments the provincial administrative centre of ancient Beer-sheba gains in stature.

Yet the book is not without its problems. In one sense it looks like much ado about nothing: some of the best finds seem to come from debris loci (cf. Chapters 13, 17 – Egyptian objects, Aramaic ostraca); a whole chapter (22) is devoted to insignificant remains at a nearby site; and about one third of the loci noted on the loci list (pp. 134-5) are in Hellenistic levels but the period is given short shrift. Perhaps these are not serious faults in light of the fact that this volume is preliminary in some ways and, as the editor says, a compromise had to be made in order to publish *some* final reports at this time. Not only that, but the stated aim of the dig was "to trace the plan of the latest Iron Age City" (p. 3); and in those terms both the dig and the book must be rated a success.

In another sense, however, there is a serious fault, a gaping omission; it concerns the continuing debate on archaeological theory and practice, a debate which is reflected clearly on pp. 2-3 and in Chapter 23. The important Israeli 'school' is ably represented here, both in statement and evidence, and in presentation of the basic instructions given to area supervisors (accompanied by sample forms for recording the excavation). It is all very informative and forthright and surely represents the wisdom distilled from decades of field work. But the book only heightens one's suspicions that the basic issue of the debate, namely, stratigraphic excavation, does not mean the same thing to the participants in the debate. In fact, the impression one gets from the book is that lip-service is paid to stratigraphic excavation but it rarely interfered with 'tracing the plans' of architectural features.

Consider the assumption that detailed drawings of baulks and/or sections are the essential means for recording stratigraphy. Apparently at Beer-sheba they were drawn or photo-drawn on a selective basis rather than as the norm (cf. "Every *significant* vertical section must be drawn" p. 122, my emphasis). The few which are reproduced on Plates 7, 16 and 86 are inadequately labeled and hopefully are not typical. Now if one also considers the broad conclusion that Str. III-II represent two phases of the same city of the Iron Age, covering a period of an estimated 150 years (ca 850? – 701 B.C.), a period on which much of the book seems to focus, does it not seem strange, even in a preliminary statement, that not a single section drawing is offered as a demonstration of the probable relations between debris layers, structures, artifacts, and the like? This is the gaping omission: there is no real stratigraphic evidence, so all suggested dates and related conjectures can be accepted only with hesitation.

To sum up: the book is good and the articles are full of information, but unless and until firm stratigraphic evidence is published scholars and students will have to be satisfied with broad possibilities for the history of architecture, technology, languages, etc. at ancient Beer-sheba. Libraries will certainly want to add the book to their basic site collections for the Levant. Individuals will have to weigh their own needs and interests against the mixed value of the book.

RICHARD SCHIEMANN

CUNLIFFE, B., *The Regni*, Peoples of Roman Britain, Duckworth 1973, viii + 153 pp., 46 figs. £1.60
TODD, M., *The Coritani*, Peoples of Roman Britain, Duckworth 1973, xi + 164 pp., 36 figs., £1.60

These two volumes on the people of Roman Britain will obviously set the scene for the rest of the series which Duckworths intend to publish. It is interesting to read the two books together because the chapter headings will be uniform throughout the series and it is possible to compare the views of each author on fairly well defined topics.

The first chapter covers the tribal territory and summarises the pre-Roman iron age, and considerable divergence is apparent even between the two first chapters. Cunliffe depends very largely on historical sources and the information given by coins, whereas Todd has a much more archaeological approach tied to the old A, B, C Iron Age system which Cunliffe has discarded. Neither author leaves us to judge the evidence for ourselves because each gives his picture of coin and pottery distributions in words alone. As in many other points throughout both books the vital distribution map or illustration is missing.

The second chapters on the history of the area from 43 to 367 present a fascinating contrast. While the scientifically trained pre-historian, Cunliffe, is painting a tear-jerking picture of the old age of Cogidubnus, the classically trained Mr. Todd gives us a very cool, objective and archaeological view of his area. Following his historical sources more than his archaeology, Cunliffe gives us considerable blood and thunder in the 3rd and 4th centuries which Todd, probably quite rightly, eschews.

The two authors come nearer together in the third, fourth and fifth chapters which concern communications and towns, rural settlement, and industry and economy. Is it accident or design, I

wonder, that both authors take as their prime industries iron, stone, salt and pottery. Whatever the answer, these chapters are useful collections of information made easily available. In the last chapter, the late 4th and 5th centuries, our authors again diverge with Cunliffe in hot pursuit of an army of Germans caused by a decline in the birth rate of Roman Britain, both of which need far more evidence before they can be accepted into the approved canon. Mr. Todd on the other hand handles the problems of the late 4th and early 5th centuries with great moderation and wide comparative knowledge, which produces a summary which might well be called masterly.

Summarising the points which might usefully direct the course of future volumes it is probably reasonable to ask for more directly relevant line drawings and fewer marginally relevant muddy photographs, for uniformity of approach to the iron age and for future authors to follow in Mr. Todd's archaeological footsteps rather than Prof. Cunliffe's more historical exegesis.

RICHARD REECE

MAXWELL-HYSLOP, K. R. *Western Asiatic Jewellery c. 3000-612 B.C.* Methuen, 1971. 286 pp. 64 pls. 8 colour. 167 text figures map. £10.

WILKINSON, Alix *Ancient Egyptian Jewellery.* Methuen, 1971. 266 pp. 77 text figures. 64 pls. 8 colour. £8.50.

A review of two more volumes in the series of Methuen's Handbooks of Archaeology is long overdue, and readers interested in jewellery will have already had a chance to compare the authors' different approach to the subject. Both books taken together cover the full extent of the Fertile Crescent and of the Nile Valley. Mrs. Maxwell-Hyslop has the more complicated assignment to control, and she has wisely divided her material in geographical areas and chronological phases. Her study begins in Mesopotamia, and she takes as her starting point the jewellery from Ur, dating from Early Dynastic III, roughly equivalent to the First Dynasty of Egypt, c. 3000 B.C. Though few examples of earlier jewellery have survived in Mesopotamia, there is enough to show great competence in technique and a wide choice of stone for beads and inlays. Mrs. Wilkinson is fortunate in having spectacular jewels to display of the Early Dynastic Period from both Upper and Lower Egypt. She treats the main historical periods one by one, subdividing them according to the kind of ornament, amulets, bracelets, collars, necklaces, diadems, finger-rings and girdles. This has advantages since it is possible to follow the use of any ornament through history, though it would have been useful to refer back directly from the plates to the page references, as Mrs. Maxwell-Hyslop does throughout.

Trade had already brought lapis lazuli from Afghanistan to Egypt in the earliest times, and who can tell whether future excavation may not show that products and skills also moved in the reverse direction? The closed guilds of expert craftsmen were a confraternity selling their wares in the richest markets, and adapting their style to meet the tastes and traditions of their customers, wherever they might be, just as they do today. The specialised art of granulation, for instance, should be traceable throughout its development and use, if it emanated from one source. Unfortunately, the index (M-H p. 117) is sadly deficient in page references to this technique and students should not rely on it in order to obtain a full picture of this and other processes. Mrs. Maxwell-Hyslop is herself undecided on the problem, comparing the developed granulation practised by Kassite smiths in the fourteenth century to the fine work seen in Egypt during the nineteenth century at Dahshur and Lahun (pp. 164-5). Earlier references note its appearance in ED III in Sumer, at Tell Brak in N. Syria and at Troy, all dating from before 2000 B.C.

Soon after that date, few personal ornaments are recorded from graves in the Syro-Palestinian area, and it was only in the seventeenth century that the fully-developed art of granulation dazzled the excavators by its profusion and complexity at Tell el-'Ajjul. It is strange, however, that granulation was uncommon in the jewellery of Queen Ahhotp, mother of Kamose last king of the Seventeenth Dynasty and his brother Amosis, founder of the Eighteenth Dynasty, just at the time when the art was most skilled at the great emporium on the borders of Egypt. Possibly the frontier was closed, though this explanation would not apply after the campaigns of Tuthmosis III had established an empire. Nevertheless, it is a fact that no granulated jewellery has come to light in Egypt in New Kingdom contexts, until the treasures were revealed in Tutankhamen's tomb.

Rare pieces of granulated gold-work were found in the Aegean world, notably the hornet pendant from Mallia, dated by Higgins to the seventeenth century or earlier, just when one would expect to find granulation at 'Ajjul, but in strong contrast, Shaft Grave III at Mycenae (1550-1500 B.C.), only produced one pair of earrings embellished in this way, in keeping with the scant use of the technique in contemporary Egypt. If the craftsmen did not congregate in Egypt or the Aegean world after this time, they may have continued business further north at international centres such as Ras Shamra-Ugarit and Alalakh, where the texts contain many references to gold, silver and precious stones used in the productions of fine metal work and jewellery (M-H pp. 134 ff.)

Mrs. Wilkinson devotes a short first chapter to the craftsmen and to the words they used in their

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work. Mrs. Maxwell-Hyslop in her introduction dwells on the terms so far identified for them and their materials in Assyrian tablets; both authors show many illustrations of the jewellery depicted on the monuments and make useful comparisons to objects found in the tombs. Full value of the fine drawings in the texts by Suzanne Chapman and Jane Cook are sometimes lost through over reduction, and the photographs in colour and black and white are uneven in quality and definition. There is still room for a technical study by a working jeweller on the whole craft as practised in the ancient near east.

Ornithologists may not agree with the proposed identification of the earring, or more likely, the nosering illustrated in colour on pl. E with *Falco biarmicus* (M-H p. 118). Another possibility must be put forward that the bird represented is the wryneck *Yunx torquilla*, a suggestion first made by Miss S. Benton. The bird has its Greek name from its loud alarm call, and its English name because it turns its head from back to front in courtship. It was the standard love-charm in Greek literature, and the bird is shown on black figure Attic pottery in the early seventh and sixth centuries B.C. Mrs. Wilkinson draws attention to a Middle Kingdom pectoral (p. 89 and Pl. XIX) where she notes that the two confronted birds look more like song birds than falcons. There is an even more convincing representation of what is possibly the same bird as that seen on the 'Ajjul ornaments in the shape of the magnificent pair of earrings from Tutankhamen's tomb, rather curiously described as having a falcon's body and a duck's head (p. 124 and pl. XLV B). Better photographs of this masterpiece appear in the exhibition catalogue *Treasures of Tutankhamen* (British Museum, 1972), where it is stated that earrings were in vogue in Western Asia for many centuries prior to the Hyksos invasion of Egypt. In fact, there is no evidence on monuments or in tombs that earrings were worn in the Syro-Palestinian area before the sixteenth/seventeenth-century B.C.

If too much attention has been given in this short review to the jewellery of the late fourth to the second millennia, it does not mean that both books do not contribute valuable discussion of first millennium problems in this sphere. On the whole, the work is heavy and clumsy compared to what has gone before; all the techniques were still practised, and the Assyrian reliefs provide more evidence than actual finds can do concerning changing fashions. Especially useful in this respect are figs. 126-7, assembling drawings of earrings as shown on closely-datable reliefs. Though it may be merely the accidents of discovery, it does appear that jewellery in Egypt suffered a decline commensurate with that country's reduced political importance during the first millennium. Mrs. Wilkinson reports that there is a far greater quantity of gold objects from the Kushite kingdom than from Egypt during the Twenty-third to Twenty-sixth Dynasties, which is not surprising in a country where gold was plentiful. Much information is assembled for students in various lists, which form a substantial part of both books, but viewing them as part of the same series perhaps they would have been easier to use if a more uniform format had been adopted throughout. Mrs. Maxwell-Hyslop provides an Index of Sites and a General Index, which includes the geographical references and personal names, though it is by no means complete, whereas Mrs. Wilkinson divides these subjects into separate lists and adds an Index of Museums. The notes in the Western Asiatic book are placed below the relevant page, but in the Egyptian book they are grouped together at the back under chapter headings, which is less convenient for the reader. Nevertheless, both authors are to be congratulated on the completion of a most worthy attempt to collect and coordinate a mass of material presented in a readable form.

No doubt the publisher must take responsibility for the jacket illustration on the Egyptian book, which according to the inner flap was a pectoral belong to Tutankhamen, though the original owner is clearly named as Sesostri III.

OLGA TUFNELL

RENFREW, J. M. "Palaeoethnobotany", With figures drawn by Alan Eade. London: Methuen & Co. Ltd., 1973. xviii + 248 pp., 49 pl., 130 figs, 3 maps. £6.50.

Scientific studies in archaeology are inherently cost-intensive, and archaeology is an inherently impecunious discipline. This being so, a textbook covering any topic which can be pursued within the practical limitations of an amateur's resources will attract the attention of a not inconsiderable potential market: there are, after all, not only the growing hordes of "Regional" and "Rescue" archaeologists, but also the still more important archaeologists of the "Developing Countries" where relevant specialists are either non-existent, or cannot be spared from more vital work. For such purposes, the most exacting standards are essential at every stage — and the communication and propagation of authoritative experience is a far more proper endeavour for the scholar than the nurturing of an exclusive, condescending or plain obscurantist mystique.

The title of Dr. Renfrew's book might suggest that one of the most urgently needed textbooks has at last appeared; however closer inspection results in distinctly modified rapture. Dr. Renfrew has, understandably, not attempted to write the definitive and encyclopaedic tome on Palaeoethnobotany, whose annunciation seems as remote as its advent. What she has written is a useful, but somewhat curious mélange, of distinctly Eurocentric bias, covering general reviews of the history, techniques, and

interpretation of palaeoethnobotanical studies; the major crop plants and their archaeological records, information on a miscellany of other plants; and a chapter of synthesis.

The section on techniques has but one sentence on seed-flotation cells, which Dr. Renfrew appears to see as no more than a device for deluding seed-analysts in a transgression of superfluous material. One hopes that in a further edition, this state of affairs would be remedied. It is also rather disturbing to find no mention of the disastrous effects of successive cycles of wetting and drying upon carbonised botanical material – is this why her acorns explode and other peoples' don't? Nor does she mention the extraction techniques that are extensively used by geological botanists.

The most serious criticism that can be made of the chapter on "Interpretation and Sampling" is that Dr. Renfrew largely neglects the problems and possibilities of "archaeological context", and although she acknowledges the fact that deposits of carbonised seed are not random (p. 21), she nonetheless proceeds from the fundamental postulate that "... samples ... in general [represent] crops of the most numerous species present ..." (p. 22). Thus the conclusions she subsequently draws from a mass of her hard-won data pivot upon the validity of an assumption that is, at best, contentious; and it is ominous that a seed deposit she uses to illustrate her ideas about mixed cropping also contains *Pistacio* nutlets – an absurdity of which she herself is aware. Dr. Renfrew mentions the measurement of grains, but makes no comment upon the uses or interpretation of such data, nor does she discuss the usefulness of the various metrical parameters quoted by herself and other researchers. Cumulative tables of figures are an indigestible method of communicating results, and since both Sir Harry Godwin and she had experimented with graphical methods of presentation it would be interesting to have her views on the possibilities and drawbacks to such approaches.

The bulk of Dr. Renfrew's book (some 160 pp.) consists of a compact catalogue of the fruits and seeds that have been reported from archaeological sites in Europe and the Near East up to 1971 A.D., recording brief morphological descriptions, sites, periods, and some of the metrical data. For wheat and barley, she also documents the major extant races, and the more important lines of phylogenetical evidence: similar coverage is given (where possible) to the other major cereal, pulse, and fruit crops. The accompanying illustrations are mainly of modern material, drawn with great care by Mr. Eade. In view of Dr. Renfrew's earlier cautioning statement that morphological changes accompany fossilisation, this is somewhat frustrating. Personally, I find Dr. Casparie's illustrations of palaeoethnobotanical material much more informative. It is a bitter disappointment that although "Criteria for Palaeoethnobotanical Identification" are given for many of the entries, this is misleading – they are not analyses of distinguishing characteristics for fossils, but rather straightforward morphological descriptions, and cannot compete with Dr. van Zeist's happy lucidity on this topic. Nor is the only book that attempts to systematise the identification of European seeds listed in the bibliography (K. Bertsch: "Früchte und Samen", Ferdinand Erke Verlag, Stuttgart, 1941). The other weakness of this part of the book is connected with the incomplete coverage of families of plants: for example twelve species of oats are mentioned, although according to Bor there is a total of 70 or so species throughout the world; and of the 25 species that the same authority classifies in the genus *Aegilops*, only three species are mentioned, of which *Ae. squarrosa* (non L.) is better known as *Ae. tauschii* Cosson since the holotype was in fact *Ae. triuncialis* Linn.

The book ends with a brief but interesting chapter on the nutritional values of various plants, and a concluding synthesis of the development of agriculture in the Near East and Europe in prehistoric times, which displays the catalogued data in a gratifying archaeological perspective.

The presentation of the book is attractive, and the proof-reading has been moderately thorough – but on pp. 65 and 129 a series of indices are quoted and tabulated as being length/breadth, whereas they are variously B/L and 100 B/L; the ancestor of barley is not wild rye (p. 82); and almond is given two different generic names and two specific names within two paragraphs and an illustration (pp. 156-7). In other respects the errors appear to be tolerably unimportant. The heads of the leaves are stained with a water-soluble dye, and the photographs (a few of which are of less than adequate quality) are in a solid, water sensitive block at the back of the book – features that discourage the use of the book as a *vade-mecum*.

Dr. Renfrew's book has had the misfortune to have been gestated during one of those periods that occur in every field of study, when a great number of radical developments have occurred with unusual rapidity; and it now accordingly displays more serious defects than its author could have foreseen. Like the beer on sale at the summit of Snowden, however, it is in the right place at the right time, whatever other faults it may have. Its major attraction seems to be that it offers a very compact, systematic chrestomathy culled from a wide range of sources, (a few are very obscure) and augmented with a substantial quantity of unpublished data. Few libraries will have more than a small proportion of the original sources, and they will probably have bought this book already; the others will find it an almost indispensable acquisition, while students will appreciate its convenience and relatively modest price. To paraphrase a famous periodical, Dr. Renfrew's book is not a Best Buy, but it certainly represents Good Value for Money.

R. N. L. B. HUBBARD

BOOK REVIEWS

CAMPS, G., (ed.) *Les civilisations préhistoriques de l'Afrique du Nord et du Sahara*. Doin, 366 pp., 160F.

The last major syntheses devoted to north African prehistory were those of Vaufreys and Balout both published in 1955, that is to say that the new masterly book of Professor Camps is most welcome. In twenty years a great deal of new data has been accumulated leading to the need for a re-evaluation of the formerly defined cultures. One of the main interests of this book, apart from formulating interesting new hypotheses, resides in the multivariate approach to the problems. A great deal of information concerning the fauna, the flora, the geology, the way of life, the diet, the settlement patterns, as well as the art, the dental mutilations and the types of burial, provide a general background to the lithic assemblage, allowing a more exact picture of the past to emerge. Attracted by the title, some readers, might be slightly disappointed that only one chapter is devoted to the Palaeolithic, but since most of the new data accumulated during these past twenty years is concerned with the later periods, this is only a minor point. Three chapters are devoted to the Epipalaeolithic, the Capsian, the development of the Neolithic in North Africa. It is worth mentioning here the invaluable bringing together of the cumulative graphs of 210 industrial horizons, published in a number of different site reports or reviews and allowing the reader to have a broad view of the industries discussed. About the Capsian, it is perhaps regrettable that Camps dismissed the Kenya Capsian as a possible ancestor of the Capsian of North Africa on relative dating alone, especially after the recently published work, (Isaac, Merrick and Nelson, 1972) in eastern Africa (Enderit Drift, Kenya Capsian dated to 12,165 B.P.).

The three other chapters deal with the different facies of the Neolithic. Camp's notion that pottery developed from diet modifications, consequent on agriculture (p.217), seems very debatable. In the Near East, agriculture preceded the invention of pottery by at least a millennium, and some societies in the Pacific are agriculturalists but without pottery (Forde, 1968, 196). The inverse is also true and a number of societies in Asia, America and Africa have pottery but no agriculture (Forde, 1968, 17); pottery has been found in East Africa with a date of 8420 B.P., long before the appearance of agriculture in this area (Robbins, 1972).

The book ends on an introduction to the metal ages and the origin of the Berbers. The work of Professor Camps with its great abundance of documentation, the rich illustrations and the assessment of knowledge acquired in the last twenty years, is an invaluable tool for students of African prehistory.

FRANCOISE HIVERNEL

REFERENCES

- Isaac, G., Merrick, H.V., Nelson, L.M., 1972, Stratigraphic and archaeological studies in the Lake Nakuru Basin, Kenya. *Palaeoecology of Africa*, VI, Zinderen Bakker, E.M., ed., Cape Town, p.225-232.
Forde, C. D., 1968, South Solomon Islanders, in : *Habitat, Economy and Society*. Methuen, London, p. 196.
Forde, C. D., 1968, The Adaman Islanders, in : *Habitat, Economy and Society*, p.17-18.
Forde, C. D., 1968, The Yokut, in : *Habitat, Economy and Society*, p. 41-44.
Robbins, L. H., 1972, Archaeology in the Turkana District, Kenya. *Science*, vol. 176, n. 4033, p. 359-366.

RICHMOND, I. A., *The City Wall of Imperial Rome*, Oxford, 1930; reprinted by McGrath, Maryland, 1971. Pp. xiv + 279, 22 plates, 45 text figures. \$32.

Sir Ian Richmond's account of the City Wall of Rome is still a standard reference for Roman defensive architecture. He made use of all the available evidence, literary and epigraphic as well as archaeological, to present a new interpretation of the Wall and its history. Previous scholars accepted the basic structure as Aurelian, with extensive modifications by Honorius, and later repairs by Belisarius. Richmond proved that the original foundation did indeed belong to the later third century, and went on to show substantial alterations, which he attributed convincingly to Maxentius. The work of Honorius was to strengthen the gates and towers; a fourth period, characteristic of patching after an earthquake, was dated to Valentinian III. The Gothic Wars involved extensive repairs, by Belisarius, and also apparently by Theoderic.

In addition to this important reassessment of the Wall's chronology, Richmond included a detailed architectural study of the gates, towers, *necessaria*, and key sections of the curtain. His reconstructions of these are a valuable contribution to the study of Roman defences in general.

Richmond finished his study with the Byzantine period, and no comparable work has yet appeared for the mediaeval and later modifications and extensions to the Wall. (A comprehensive Italian study of the gates, *Le Porte di Roma*, by L. Cozzi, was published in 1968).

The reprint has been made on offset litho from an Oxford original. The text, drawings, and reproductions of prints have come out well, but the photographic plates are less crisp: the details of the various building phases (plate III) are lost, and the inscriptions on plate XVI are difficult to decipher.

The book has long been unobtainable, and this reprint is particularly welcome; however, the price seems inordinately high for a copy of this nature, and is well beyond the reach of the average student and interested visitor to Rome.

JOANNA BIRD

SINGH, P. *Neolithic Cultures of Western Asia*, Seminar Press 1974. xii + 244 pp., 74 figs. £4.00

Mr. Singh concludes his introduction to this book by saying that it is not more than a synopsis, without pretension to original research, but that – “as such it may prove useful to specialists and students alike”. Perhaps for once it is the blurb which comes nearer to the truth in claiming that – “it will be of great value . . .”; for one feels that a work summarising the ‘State of the Enquiry’ on this particular subject ought to be newly written every ten years or so, and one is delighted to find it done with so much clarity and intelligence. It is of course wrong to call it a “comprehensive survey” of Near Eastern “prehistory”, since the writer sets a terminal limit to his subject about two millennia before the invention of writing. This fact and the bearing it has on his choice of a title, are explained at some length in his initial pages on the ‘Problems of Terminology’.

He first recalls Gordon Childe’s conception of a ‘Neolithic Revolution’ (1950), and Miles Burkitt’s identification of its four main criteria as – agriculture, domestication of animals, pottery and ground stone tools (1956). As he says, later evidence suggested that the timing of these inventions differed widely from site to site, and that the transition from food-gathering to food-producing should be taken to imply an evolutionary rather than a revolutionary movement. At the same time, some scholars had become dissatisfied with the imprecision of ‘neo-Graecisms’ such as ‘Neolithic’ and ‘Mesolithic’, and Braidwood proposed an elaborate series of ‘eras’ and ‘sub-eras’ in the transitional process. Mr. Singh makes a fair assessment of Braidwood’s diminishing confidence in this terminology, as shown in his own later writings. He also remembers that it was Braidwood again who, over a long period, attempted to define geographically a ‘natural habitat zone’ in which the domestication of food-grains and animals took place, and he notes how this also has needed to be reconsidered, in view of the discoveries at many sites outside his prescribed ‘zone’. At some of these symptoms of food-producing are in evidence, even though three of Burkitt’s four requirements are still missing. Mr. Singh therefore concludes – “So the word ‘Neolithic’ is here retained, although food-production is the only one of the classical criteria by which it may now be defined.”

The book then goes on to summarise the results of excavations and the study of surface materials at all relevant sites, under chapter headings which include the Levant, Turkey, Iraq and Iran. From twelve to twenty names appear under each heading, some of them referring to single excavations, others to regional groupings of sites. Many more are mentioned ‘en passant’, and one realises that the aggregate of information obtained from all these operations, though some of it till now lacks adequate publication, must already represent a rich acquisition. In these chapters then, it becomes refreshingly easy to follow the successive stages in the search for Neolithic man; and one sees how the most recent discoveries, coming thick and fast as the scale and efficiency of research increases, serve both to correct and to strengthen the loose framework of understanding created by the pioneer investigations of earlier years.

To illustrate this development, one can here do no more than select a few individual examples of discoveries which have most recently shared the limelight of professional interest and approbation. One of these in the Levant sector, is the site called Mureybit discovered by Van Loon on the middle Euphrates, which seems to have been a permanent settlement before either agriculture or herdsmanhood were practiced. It had “round or curved buildings” made of red clay, with limestone paving and entered from above. The Hunters’ quarry included wild cattle, gazelle, onager, pig and wolf. Wild barley and einkorn were reaped and there was a huge flint industry. The earliest radio-carbon computation here is 8625 B.C., and it is accordingly a little disconcerting to find precisely the same situation prevailing, almost two thousand years later at a site like Suberde on the Anatolian plateau, which its excavator, Bordaz described as a “hunters’ village”. Another increasingly interesting site in a more easterly part of Anatolia, near the sources of the Tigris, is Cayönü where Braidwood and Cambel have recently been excavating. Here, in an aceramic setting between 7500 and 6500 B.C., domestication is seen clearly to be in progress, while the architecture, particularly in the deeper levels, shows signs of remarkable sophistication. The actual building remains are peculiar: surprisingly regular ‘grills’ of stone foundations, with spaces between too small for use except as

storage, accessible only from above. It is tempting to compare them with the equally eccentric building remains recently found in the deepest levels at Umm Dabaghiyah in Iraq, though these should be dated at least a thousand years later. Another innovation in a slightly higher level at Cayönü is the so-called "terrazzo pavement" with its striped lines of colour, whose description Mr. Singh quotes from Braidwood on p. 84. For a very near parallel to this one must turn to Tepe Guran south of Kermanshah in Iran, (another well excavated and well recorded site), where Mortensen found the pavement illustrated on pp. 68 and 69 of this book; but this again is some centuries later.

Mr. Singh's careful coverage of sites such as these accounts for the greater part of his text. His commentary is systematic and informative. In every case available radiocarbon dates are compared and they appear elsewhere in tabular form. The writer has done well to avoid the excessive use of professional jargon, and where verbatim quotations have been necessary, the passages are well chosen. One appreciates for instance the 'higher commonsense' of C. A. Reed's reflection on animal domestication (p. 10) – "It is seemingly the age-old habit of pet-keeping of the young of the wild animals by women and children that led to taming and eventually to the keeping and breeding of adult animals". Non-specialists also will welcome a characteristic quotation from Hans Helbaek (p. 202), explaining in a few sentences the actual process of domesticating wild grasses for food-grain. Taking a broad view of this book, it is its serial account of separate sites in their appropriate geographical setting which will be of primary use to scholars for easy reference. But without the 20-page 'Summary' at the end, the work would have been of less value. For here, effectively distilled from a plethora of archaeological reports and commentaries, is the harvest of conclusions which has already made the whole laborious and complicated enquiry worthwhile: an interim situation – report on an important area of archaeological research, under headings which include the subject of neolithic trade in obsidian – a matter of special significance because it may well have provided the first vehicle for the diffusion of abstract ideas.

Complaints? Sakjegözü deserved a mention: Belbasi in Pamphylia is absent from the Bibliography: the chronological table is irritatingly difficult to read.

SETON LLOYD

VAUGHAN, Patrick H. *The Meaning of 'bāma' in the Old Testament; A study of etymological textual and archaeological evidence in the Society for Old Testament Studies Monograph Series, No. 3*, Cambridge University Press, xiv + 90pp. 2pls.

The adoption by Israel of the preliterate practices of Canaanite religion has attracted considerable confusion to the biblical texts. It is particularly in the technical terms of the cult and its associated paraphernalia that Old Testament scholars have been able to do little more than guess at the meanings and the significance of many such terms. The above volume seeks to grasp once and for all the meaning or meanings of the biblical term 'bāma' and its cognates. The usual rather glib translation is a 'high place', leaving it to the imagination of the reader to decide what this might have been. The author here combines a thorough investigation into the uses of the word both in Hebrew and in cognate languages with whatever archaeological evidence is currently available.

The major part of the book, and by far the better, is a systematic discussion of the meaning and possible derivation of the term. By comparing parallel phrases in Akkadian and Ugaritic, two basic areas of meaning emerge – a secular and a cultic meaning. The secular meaning can have two senses; the first is topographic in the sense of 'slopes' or 'hilly flanks'; the second is anatomical in the sense of the 'back' of an animal, or rather its 'flanks'. This sense may even extend to the general term 'beast'. The cultic meaning, the one normally understood, implies a 'cultic platform', and perhaps even further, an 'altar'.

The second part is a brief discussion of "high places" that have been so termed by their excavators, at Megiddo, Dan, Nahariya, Arad, Shechem etc.. The author begins by upholding Parr's dismissal of the infamous 'Conway High Place' at Petra, and then goes on to draw a distinction between two main forms of structure – a low truncated cone with a stepped approach, i.e. a cultic platform, and a low oblong platform which acted as an altar base, i.e. the extension of the meaning to 'altar'.

The literary critical part of the book is extremely thorough, as with scholarly finesse the author both enumerates and draws out the relevant meanings. Certainly this part of the monograph will become a standard work on the subject. Less convincing is the application of the same morphological technique to the archaeological evidence. The examples that are given are only briefly described, and the writer is less critical of the evidence, for as he states: –

'the descriptions of the sites are given . . . using as far as possible the author's own words'.

By comparison to the earlier part of the work, comment and criticism is lacking, as so often happens when the biblical scholar tacitly accepts the evidence of the archaeologist. An example of this would be the use of the En Gedi Chalcolithic sanctuary which is invoked at one point in the discussion; this

is indeed a most difficult piece of evidence to use since its function, and the culture to which it belongs, are so occluded by time.

The distinction between the circular 'bama' and a rectangular one – possibly an altar base – whilst an interesting one, may have no real significance. If fault there be in such a distinction, it may not rest with the author in this case, but rather things 'cultural' in archaeology should always be treated with a certain degree of scepticism, as the term is frequently invoked to explain phenomena only when a secular identification has not been forthcoming.

DAVID PRICE WILLIAMS

NEWELL, R. R. and VROOMANS, A. P. J., *Automatic Artifact Registration and Systems for Archaeological Analysis with the Philips P1100 Computer; A Mesolithic Test Case*. Oosterhout, Anthropological Publications; New York. Humanities Press 102pp., 1pl. figs. 25.

With the ever increasing need for definition in archaeological excavations, great strain is placed upon recording techniques, particularly the registration of artifacts. With this increased demand and with ever increasing costs in field-work, considerable streamlining is needed to avoid delay in the excavation process. The above book attempts to outline a method for rapid artifact registration on site, illustrating the use of the method on a Mesolithic excavation in Holland.

The automatic Registration System is based upon the principle of scoring one of a number of possibilities for each of a number of pieces of information required per objects. If with a stone tool one wishes to record period, culture, square number, soil type and horizon, coordinates, orientation, elevation and the type of the artifact, then these facts are entered on a prepared data sheet either by entering a code or a strict measurement. The culture, period and the type of the artifact will be scored according to a numbered corpus (The Codex Book) of all the possible types, whilst the elevation, the coordinates etc. are entered as they are measured. In the field, a floor with artifacts is gradually uncovered and the objects marked but not moved. When sufficient have been uncovered, they are recorded with the relevant codes and measurements, the artifacts are then removed and the excavation continues. The apparent time saved by this method is said to exceed 50%, whilst the objects are very accurately recorded. The information thus gleaned is later transferred to computer punch cards for storage. Once entered, such information can easily be sorted to provide such conclusions as the total composition of each square by artifact type, or by dip and orientation etc. One might also ask such questions as the range of objects in a particular soil horizon.

Despite its title, this is a very understandable book which discusses a simple and effective field and laboratory technique. In places, the objective numerical approach seems to slip, for among all the cybernetics there are critical C14 dates given without standard deviations. Elsewhere, in a rather simplistic description of the method, the reader is told that:—

"... stone artifacts are placed in a finds box bearing the appropriate square number. Tobacco tins have proven to be ideal finds boxes."

It should be pointed out however that with this one site alone, a total of 17,476 artifacts were recovered, which must have taxed the respiratory organs of even the hardest smoker.

Doubts might be expressed about the efficacy of the Codex Book necessary to score each artifact. For the experiment discussed, there were 68 basic artifact types possible. A long end scraper would be scored as 0804011; if its provenance was peaty mud, the code 0561000 would be added, and so on. Two problems occur here. Firstly, if the artifacts of the site are at all varied, then the list of possible object types, soils, orientations etc. which would have to be looked up would itself perhaps be as time consuming as older methods of recording. Secondly, one is always aware of the problem that once objects have been replaced by numbers, they lose their visible meaning and are thus susceptible to error, although this source of error has been minimised by the authors.

At its best, the system is an ideal method of coping with the extremely tedious, error-fraught problem of recording quickly and accurately, and provided computer time is available and the necessary simple programmes can be written, then it is bound to speed up the process not only of excavation but also of data retrieval and interpretation.

DAVID PRICE WILLIAMS

Notes to Contributors

Papers on any aspect of archaeology may be considered for publication in the *Bulletin*. All contributions and related correspondence should be addressed to the Editor, Professor J. D. Evans, Institute of Archaeology, 31-34 Gordon Square, London WC1H 0PY. The following notes are provided as a guide to intending contributors in the preparation of their material.

1) *Typescripts* should not normally exceed 10,000 words in length. They should be typed on one side only of A4 size paper (approx. 30 cm. by 21 cm.), using double spacing and leaving wide margins (at least 4 cm. on the left). Two copies of the typescript should be submitted, the author retaining a third copy.

2) *Footnotes* should be avoided as far as possible. If any are judged to be absolutely necessary, they should be typed on a separate sheet, not at the foot of the page to which they refer.

3) *Bibliographical references* should follow the so-called Harvard system. The author's last name, date of publication and number of page should be given in brackets in the body of the text, e.g. (Sharma, 1973: 129), or, if the author's name has been cited, simply (1973: 129). Full references should be listed alphabetically according to authors' names at the end of the paper. Where the publication cited is a paper in a periodical the title of the journal should be underlined and abbreviated according to the *World List of Scientific Periodicals*.

e.g. Paper: Sharma, G. R. 1973. Mesolithic lake cultures in the Ganga valley, India. *P.P.S.*, 39: 129-146.

Book: Butzer, K. W. 1972. *Environment and Archaeology*. London: Methuen.

Article in Book: Bordes, F. 1973. On the chronology and contemporaneity of different palaeolithic cultures in France. *The Explanation of Culture Change: Models in Prehistory* (ed. Colin Renfrew). London: Duckworth.

4) *Line drawings, plans and maps* should be drawn in waterproof black ink on smooth white paper, card, or good quality tracing paper or film. Lettering should be neatly done, either by stencilling or using self-adhesive lettering such as Letraset or Presletta, which should be varnished with the spray recommended by the makers to prevent damage. All line illustrations should be at least twice the intended final size, and of a shape suitable for reduction to full page (17 cm. x 12 cm.) or half page (8 cm. x 12 cm.) size. Line illustrations should be referred to as *figures* and numbered in Arabic numerals. The number should be written on the originals in soft pencil, and should correspond to bracketed references in the text, e.g. (Fig. 3).

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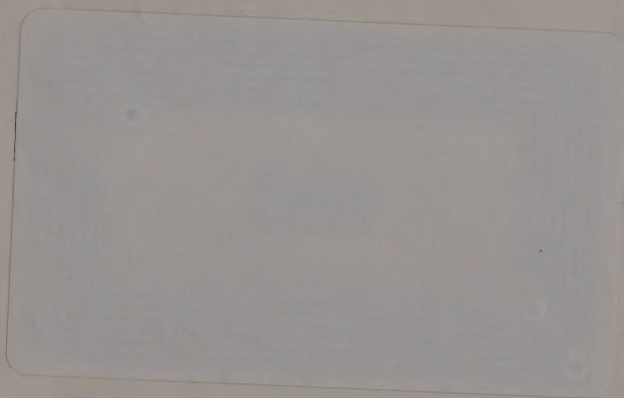
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8) *Radiocarbon dates* should be cited uncalibrated, using the convention bp, bc, ad to show that this is so. If calibrated dates are also presented, the convention BP, BC, AD should be used. Standard deviation and laboratory code should always be given.

9) *Abstracts*: a brief *résumé* of about 100-150 words should be supplied with each contribution, and will be printed at the end of the text.

10) *Submission date*: articles should be received not later than 1st October for inclusion in the following year's *Bulletin*. Articles will not be accepted unless complete with all illustrations, captions, etc. Twenty-five offprints of each paper published will be supplied free to the author. Additional offprints may be purchased at cost price; estimates of cost can be obtained on application.



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